

# Overview

**Overview for iMac (21.5-inch, Late 2015 and 2017) and iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)**

For full technical specifications, refer to Apple Support Tech Specs: [support.apple.com/specs/imac](https://support.apple.com/specs/imac).



## Serial Number Location

The serial number for the following iMac models is located on the bottom of the stand. **Note:** If the computer has a VESA mount, then the serial number is located on the underside of the VESA mount tongue.

- iMac (21.5-inch, Late 2012)
- iMac (27-inch, Late 2012)
- iMac (21.5-inch, Early 2013)
- iMac (21.5-inch, Late 2013)
- iMac (27-inch, Late 2013)
- iMac (21.5-inch, Mid 2014)
- iMac (Retina 5K, 27-inch, Late 2014)
- iMac (Retina 5K, 27-inch, Mid 2015)
- iMac (21.5-inch, Late 2015)
- iMac (Retina 4K, 21.5-inch, Late 2015)
- iMac (Retina 5K, 27-inch, Late 2015)
- iMac (21.5-inch, 2017)
- iMac (Retina 4K, 21.5-inch, 2017)
- iMac (Retina 5K, 27-inch, 2017)

When replacing the stand, use a fine-tip black permanent marker to neatly write the serial number on the bottom of the new stand. **Note:** If replacing the VESA mount tongue, then write the serial number on the underside of the VESA mount tongue.



# Input Devices

## Magic Trackpad 2



## Magic Mouse 2



## Magic Keyboard



## Magic Keyboard with Numeric Keypad



- Pairs via Bluetooth or via Lightning connector
- Embedded battery
- On/off switch
- Lightning connector
- Can be used wired or wireless (keyboards)

### On/Off Switch

To turn on the Magic Trackpad or Magic Keyboards, use the on/off switch (see 1 below) on the back of the device. This switch is located on the bottom of the device for Magic Mouse 2. If green is visible inside the switch, then the device is turned on. There is no indicator light. **Note:** When Magic Keyboards are turned on and paired with a system, the Caps Lock LED will light up when Caps Lock is active.

### Lightning Connector

The devices can be used wirelessly or wired, by plugging into the Lightning connector (see 2 below).

#### Magic Trackpad 2 (back)



#### Magic Keyboard (back)



#### Magic Keyboard with Numeric Keypad (back)



#### Magic Mouse 2 (bottom)



### Pair the device:

- The device will automatically pair when plugged in. Plug the device into a USB port on the computer and it will be detected.
- The device can also be paired wirelessly. Turn the device on, find the name in the Bluetooth preference pane, and click the name to pair.

**Note:** To check if the device is turned on, go to System Preferences > Bluetooth or click the Bluetooth icon in the menu bar. If the device is both turned on and paired with the computer, then it will show in bold.

### Charge the device:

- Plug the device into a USB port on the computer using the Lightning cable.
- Plug the device into a 5W, 10W, or 12W Apple USB Power Adapter using the Lightning cable.



**Note:** The computer will show an alert when the battery is low. The battery level information can also be found by selecting the device in the Bluetooth menu in the menu bar.

# General Troubleshooting

## Update Software and Firmware

**Important:** Before you begin troubleshooting, ensure the correct version of macOS is installed, and check for and apply the latest software and firmware updates. Computers sometimes exhibit symptoms that indicate the wrong version of macOS system software is installed. Check article [HT204319: macOS versions and builds included with Mac computers](#) to make sure system build is correct for this computer model.

Firmware is the name given to software that is written into memory circuits such as flash memory, that will hold the software code indefinitely, even when power is removed from the hardware. Firmware on Intel Mac computers is designed to be updated if necessary by running the macOS Software Update check (available in the Apple () menu) while the computer is connected to the Internet.

For more information about firmware updates, refer to article [HT201518: About EFI and SMC firmware updates for Intel-based Mac computers](#).

## Troubleshooting Techniques

For more information, go to [ATLAS](#) and enter “troubleshooting” in the search field.

## Hardware vs. Software

To isolate a hardware issue from a software issue, refer to article [HT203161: Isolating issues in macOS](#).

To troubleshoot a software issue, refer to the following articles:

- [HT201516: How to troubleshoot a software issue](#)
- [HT201861: About incompatible software on your Mac](#)
- [HT204323: If a flashing question mark appears when you start your Mac](#)
- [HT204904: How to reinstall macOS](#)
- [HT202574: Mac mini \(Late 2012 and later\), iMac \(Late 2012 and later\): About Fusion Drive](#)

## Power-On Self-Test (POST)

Intel-based Mac computers such as the iMac rely on a combination of tones and blinking LED lights to display Power-On Self-Test (POST) error codes.

- If the computer detects out-of-specification or no Random-Access Memory (RAM), the screen will remain black but the computer will beep. This error condition may be due to physically damaged RAM, installing an incorrect type of RAM, or not having RAM installed.
- Some RAM may appear to pass POST, but still cannot be used by the operating system. In this case, the computer will display a gray screen, sound three beeps and repeat beeps until computer is turned off.
- The solution to both of these situations is to first re-seat RAM and test computer again. If RAM fails POST again, remove all installed RAM and test by installing one by one each RAM module that has been verified to work correctly on another computer (i.e., “known-good” RAM) or order new RAM.
- A sequence of tones heard at startup or a no video symptom may also be fixed by temporarily removing/replacing the backup battery.

For more information, refer to article [HT202768: About Mac computer startup tones](#).

# Quick Check Procedures

## Resetting the System Management Controller (SMC)

The System Management Controller (SMC) is a chip on the logic board that controls all power functions. If the computer is experiencing any power issue, such as not starting up, not displaying video, sleep issues, or fan noise issues, resetting SMC may resolve it.

For more information and instructions to reset the SMC on different computer models, refer to article [HT201295: Reset the System Management Controller \(SMC\) on your Mac](#).

**Note for iMacs:** If the power button is pressed while inserting the power cord, the iMac will enter a mode in which the fans run at full speed. For more information, refer to article [HT204463: iMac: Fans run at full speed after computer turns on](#).

## Resetting Non-Volatile RAM (NVRAM)

NVRAM stores certain system and device settings in a location that macOS can access quickly. Exactly which settings are stored in the computer's NVRAM varies depending on the type of computer as well as the types of devices and drives connected. To reset NVRAM:

1. Shut down the computer.
2. Locate the following keys on the keyboard: Command, Option (Alt), P, and R. You will need to hold these keys down simultaneously in Step 4.
3. Press power button.
4. Immediately press and hold Command-Option-P-R keys.  
**Important:** You must press this key combination before the gray screen appears.
5. Hold down keys until computer restarts, and you hear startup chime a second time.  
**Note:** For MacBook Pro (Late 2016 and 2017) and MacBook (Retina, 12-inch, 2017), hold down keys for at least 20 seconds. There is no startup chime.
6. Release keys.

**Note:** After resetting NVRAM, you might need to reconfigure settings for speaker volume, screen resolution, startup disk selection, and time zone information.

For more information, refer to article [HT204063: How to Reset NVRAM on your Mac](#).

## Starting Up in Safe Mode

Safe Mode (sometimes called Safe Boot) is a way to start up a Mac so that it performs certain checks and prevents some software from automatically loading or opening. These changes can help resolve or isolate certain issues on the startup disk.

Follow these steps to start up into Safe Mode:

1. Be sure the computer is shut down.
2. Press the power button.
3. Press and hold the Shift key.  
**Note:** The Shift key should be pressed as soon as possible after the power button is pressed.
4. Release the Shift key when you see the Apple logo appear on the screen. After the Apple logo appears, it may take longer than usual to reach the login screen. This is because the computer is performing a directory check as part of Safe Mode.
5. To leave Safe Mode, restart the computer without pressing any keys during startup.

For more information, refer to article [HT201262: Use Safe Mode to isolate issues with your Mac](#).

# Recovering a Lost Firmware Password

Only Apple Retail Stores or Apple Authorized Service Providers can unlock the following Mac models when protected by a firmware password:

- iMac (Mid 2011 and later)
- MacBook (Retina, 12-inch, Early 2015 and later)
- MacBook Air (Late 2010 and later)
- MacBook Pro (Early 2011 and later)
- Mac mini (Mid 2011 and later)
- Mac Pro (Late 2013)

Refer to the technician instructions in article [HT203409: If you lost or forgot your firmware password](#).

# Diagnostic Software

## Diagnostic Software for iMac (21.5-inch, Late 2015 and 2017) and iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)

### Apple Service Toolkit 2 (AST 2)

AST 2 is a cloud-based diagnostic system to help technicians triage and verify repairs for Mac computers, starting with Mid 2014 models, except for MacBook Pro (Retina, Mid 2014). With AST 2, technicians are able to initiate diagnostics wirelessly on a user's device using Diagnostic Console (a web application on a Mac or iPad). Technicians are able to view diagnostic results in Diagnostic Console.

For more information, refer to articles:

- [OP476: Latest Apple Service Toolkit download links and documentation](#)
- [TP1105: AST 2 for Mac Reference Guide - Table of Contents](#)
- [TP1118: AST 2 for Mac Reference Guide - Table of Contents \(Retail\)](#)
- [HT202731: How to use Apple Diagnostics on your Mac](#)

### Mac Resource Inspector (MRI)

MRI, which is part of AST 2, is a quick triage tool that checks for the presence of hardware and reports sensor readings. Sensors are located on a variety of parts, including the cables, fans, storage devices, power supply, display panel, and logic board. Use MRI to help isolate failures and avoid unnecessary part replacements.

**Note:** If the computer passes all AST 2 checks and a component is still suspected of fault, then verify with other diagnostic tools.

### iMac (21.5-inch, Late 2015 and 2017) Thermal Sensors

SMC Name	Location	General Description (Degrees C)	Repair Suggestion
TA0p	Logic board top / back side, lower right, near Ethernet connector	MLB ambient temperature	Excessive ambient temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tb0p	Logic board top / back side, upper center, near top edge of board	Backlight Controller proximity temperature	Excessive backlight controller temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
TC0p	Logic board bottom / front side, center, under CPU	CPU proximity 0 temperature	Excessive CPU temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
TI0p	Logic board bottom / front side, lower left, on large IC above USB-C connectors	Thunderbolt I/O proximity temperature	Excessive I/O temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connections and fan operation.
TL0p	LCD panel, back	Display temperature	Excessive display temperature or sensor is damaged or disconnected from SMC. Check logic board and display connectors and fan operation.
TL1p	LCD panel, back	TCON temperature	Excessive display temperature or sensor is damaged or disconnected from SMC. Check logic board and display connectors and fan operation.
TM0p	Logic board top / back side, center, between SO-DIMM sockets	DIMM proximity 0 temperature	Excessive memory temperature or sensor is damaged or disconnected from SMC. Check memory connectors and fan operation.
Tm0p	Logic board top / back side, upper left, near SO-DIMM sockets	MLB proximity 0 temperature	Excessive logic board temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tm2p	Logic board top / back side, lower center, near CPU	MLB proximity 2 temperature	Excessive logic board temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tp2h	Inside power supply	PSU T2 secondary heat sink temperature	Excessive power supply temperature or sensor is damaged or disconnected from SMC. Check power supply connectors and fan operation.

### iMac (21.5-inch, Late 2015 and 2017) Electrical Sensor Table

SMC Name	Location	General Description	Units	Repair Suggestion
VC0C	Logic board	CPU Core load-side	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
VC0G	Logic board	CPU Core GT+GTX	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
VD2R	Logic board	Power Supply 12V	Volts	Out of range power supply voltage. Check power supply connections to the logic board.
VM0R	Logic board	CPU + DIMM 1.2V	Volts	Out of range CPU or memory voltage was found or open signal to SMC. Check logic board connectors.
VR35	Logic board	3.3V S5 load-side (SSD)	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board and flash storage connectors.
VR54	Logic board	5V S4 load-side	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
IC0C	Logic board	CPU IA Core (IMON)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC0E	Logic board	CPU VCC EDRAM	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC0G	Logic board	CPU Core GT+GTX (IMON)	Amperes	Out of range GPU current was found or open signal to SMC. Check logic board connectors.
IC0P	Logic board	PCH 1.0V	Amperes	Out of range PCH current was found or open signal to SMC. Check logic board connectors.
IC0S	Logic board	CPU VCCSA (IMON)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC20	Logic board	CPU High (CPU IA/GT/SA/VCCIO)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
ID2R	Logic board	Power Supply 12V	Amperes	Out of range power supply current. Check power supply connections to the logic board.
IH1R	Logic board	SSD	Amperes	Out of range flash storage current found or open signal to SMC. Check logic board and flash storage connectors.
IR13	Logic board	CPU + DIMM 1.2V	Amperes	Out of range CPU or memory current was found or open signal to SMC. Check logic board and memory connectors.
IR35	Logic board	System 3.3V	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IR54	Logic board	System 5V	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.

#### iMac (Retina 4K, 21.5-inch, Late 2015 and 2017) Thermal Sensors

SMC Name	Location	General Description (Degrees C)	Repair Suggestion
TA0p	Logic board top / back side, lower right, near Ethernet connector	MLB ambient temperature	Excessive ambient temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tb0p	Logic board top / back side, upper center, near top edge of board	Backlight Controller proximity temperature	Excessive backlight controller temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
TC0p	Logic board bottom / front side, center, under CPU	CPU proximity 0 temperature	Excessive CPU temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
TG0d	Logic board bottom / front side, center right, on large GPU IC	GPU die temperature	Excessive GPU temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connectors and fan operation.
TG1d	Logic board bottom / front side, center right, on large GPU IC	GPU die temperature	Excessive GPU temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connectors and fan operation.
TG0p	Logic board bottom / front side, center right, near power supply signal connector	GPU proximity temperature	Excessive GPU temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connectors and fan operation.
TG1p	Logic board top / back side, center left, near GPU VRAM ICs	GPU VRAM proximity temperature	Excessive GPU VRAM temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connectors and fan operation.
TI0p	Logic board bottom / front side, lower left, on large IC above USB-C connectors	Thunderbolt I/O proximity temperature	Excessive I/O temperature or logic board sensor is damaged or disconnected from SMC. Check logic board and I/O connectors and fan operation.
TL0p	LCD panel, back	Display temperature	Excessive display temperature or sensor is damaged or disconnected from SMC. Check logic board and display connectors and fan operation.
TL1p	LCD panel, back	TCON temperature	Excessive display temperature or sensor is damaged or disconnected from SMC. Check logic board and display connectors and fan operation.
TM0p	Logic board top / back side, center, between SO-DIMM sockets	DIMM proximity 0 temperature	Excessive memory temperature or sensor is damaged or disconnected from SMC. Check memory connectors and fan operation.
Tm0p	Logic board top / back side, upper left, near SO-DIMM sockets	MLB proximity 0 temperature	Excessive logic board temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tm2p	Logic board top / back side, lower center, near CPU	MLB proximity 2 temperature	Excessive logic board temperature or logic board sensor is damaged or disconnected from SMC. Check logic board connectors and fan operation.
Tp2h	Inside power supply	PSU T2 secondary heat sink temperature	Excessive power supply temperature or sensor is damaged or disconnected from SMC. Check power supply connectors and fan operation.

**iMac (Retina 4K, 21.5-inch, Late 2015 and 2017) Electrical Sensor Table**



SMC Name	Location	General Description	Units	Repair Suggestion
VC0C	Logic board	CPU Core load-side	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
VC0G	Logic board	CPU Core GT+GTX	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
VD2R	Logic board	Power Supply 12V	Volts	Out of range power supply voltage. Check power supply connections to the logic board.
VG0I	Logic board	GPU VDDCI	Volts	Out of range GPU voltage was found or open signal to SMC. Check logic board connectors.
VM0R	Logic board	CPU + DIMM 1.2V	Volts	Out of range CPU or memory voltage was found or open signal to SMC. Check logic board connectors.
VR35	Logic board	3.3v S0 load-side (SSD)	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board and flash storage connectors.
VR54	Logic board	5V S4 load-side	Volts	Out of range CPU voltage was found or open signal to SMC. Check logic board connectors.
IC0C	Logic board	CPU IA Core (IMON)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC0E	Logic board	CPU VCC EDRAM	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC0G	Logic board	CPU Core GT+GTX (IMON)	Amperes	Out of range GPU current was found or open signal to SMC. Check logic board connectors.
IC0I	Logic board	CPU VCCIO	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC0P	Logic board	PCH 1.0V	Amperes	Out of range PCH current was found or open signal to SMC. Check logic board connectors.
IC0S	Logic board	CPU VCCSA (IMON)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IC20	Logic board	CPU High (CPU IA/GT/SA/VCCIO)	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
ID2R	Logic board	Power Supply 12V	Amperes	Out of range power supply current. Check power supply connections to the logic board.
IG0C	Logic board	GPU Core	Amperes	Out of range GPU current was found or open signal to SMC. Check logic board connectors.
IG0F	Logic board	GPU Frame Buffer 1.5V	Amperes	Out of range GPU current was found or open signal to SMC. Check logic board connectors.
IG20	Logic board	GPU Core high-side	Amperes	Out of range GPU current was found or open signal to SMC. Check logic board connectors.
IH1R	Logic board	SSD	Amperes	Out of range flash storage current found or open signal to SMC. Check logic board and flash storage connectors.
IR13	Logic board	CPU + DIMM 1.2V	Amperes	Out of range CPU or memory current was found or open signal to SMC. Check logic board and memory connectors.
IR35	Logic board	System 3.3V	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IR54	Logic board	System 5V	Amperes	Out of range CPU current was found or open signal to SMC. Check logic board connectors.
IU54	Logic board	USB 5V	Amperes	Out of range USB current was found or open signal to SMC. Check logic board and I/O connections.

# Diagnostic LEDs and Test Pads

## Diagnostic LEDs and Test Pads for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)



**Warning: HIGH VOLTAGE.** Be extremely careful when working inside the computer while power is applied and system is energized. Avoid touching the logic board or power supply while the computer is plugged in. Be very careful not to touch tools to logic board components other than the test pads.

After unplugging the computer from the electrical outlet, wait two minutes before removing the display panel, disconnecting modules, or substituting cables and components. This will allow the power supply and logic board time to discharge.

Refer to these articles for more safety information:

- [TP833: iMac and Displays: Power Supply Cover Instructions](#)
- [TP914: iMac \(21.5-inch\): Safety](#)

iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015) have diagnostic LEDs and test pads that can help to troubleshoot the computer without removing the logic board.

The coin battery, located on the back of the logic board, provides power to the real-time clock (RTC) and parameter RAM (PRAM) when the computer is not connected to an AC power source. The RTC maintains the date and time, while the PRAM stores information such as speaker volume, screen resolution, startup disk selection, and recent kernel panics. The coin battery is designed to last for several years and does not normally require replacement. However, if there are issues with the functions listed above, then the RTC and PRAM may need to be reset or the coin battery may need to be replaced.

### A. Diagnostic LEDs

- See the full description of LED behaviors below the locator images.

### B. Real-Time Clock (RTC) Reset Pads

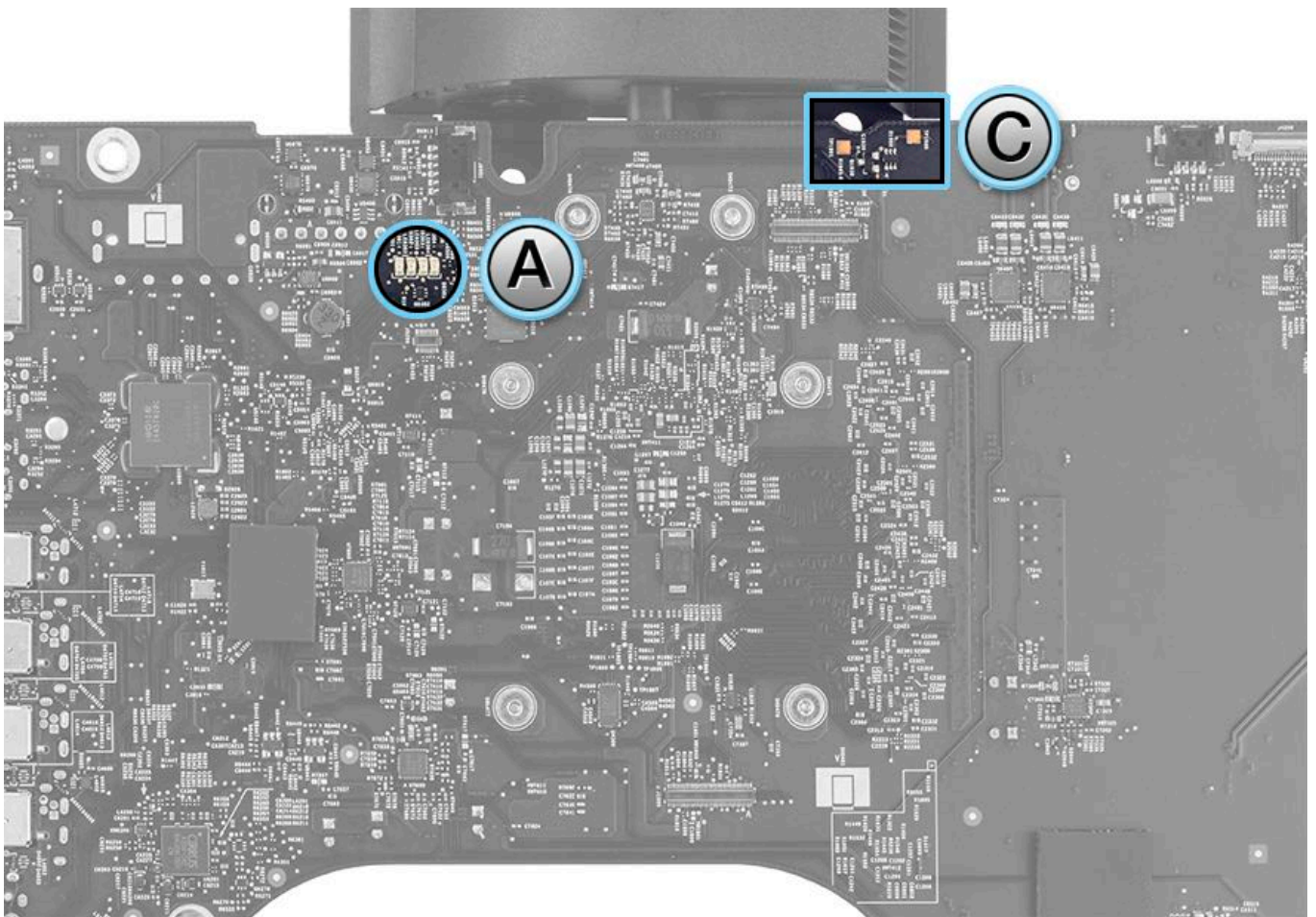
- Shut down and unplug the iMac. Allow approximately two minutes for the power supply to discharge.
- Reset the RTC by shorting the pads found in location shown below. Use the tip of a flat-blade screwdriver to touch both pads at the same time.

### C. Coin Battery Voltage Test Pads

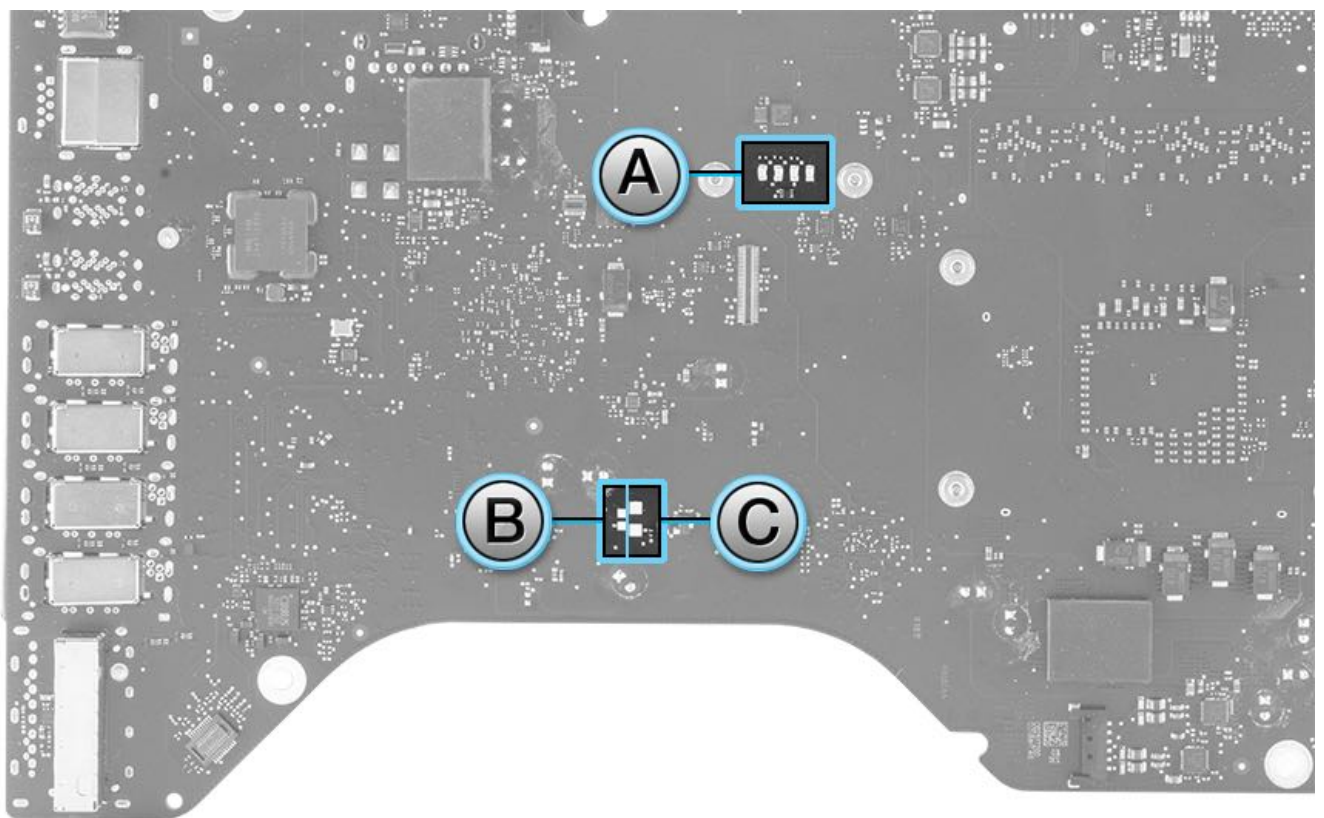
- Shut down and unplug the iMac. Allow approximately two minutes for the power supply to discharge.
- Measure the coin battery voltage by using a voltmeter set for DC. Place the probes on the pads (negative probe - left pad, positive probe - right pad). If the voltage is 2.7 volts DC or less, then the coin battery should be replaced.

### iMac (21.5-inch, Late 2015) LEDs and Test Pads

**Note:** iMac (21.5-inch, Late 2015) does not have real-time clock (RTC) reset pads on the logic board.



iMac (Retina 4K, 21.5-inch, Late 2015) LEDs and Test Pads



## Diagnostic LEDs (A)

### LED 1

- Indicates that the trickle voltage from the power supply has been detected by the main logic board. This LED will turn ON when you connect the iMac to a working AC power source. The LED will remain ON as long as the computer is on or asleep.

- When the computer has been correctly shut down, LED 1 behavior may differ:
  - If a startup event is scheduled in System Preferences/Energy Saver, then LED 1 will stay ON after a correct shutdown.
  - If no startup event is scheduled in System Preferences/Energy Saver, then LED 1 will turn OFF and will stay OFF as long as the power cord is kept connected and an AC power source is present. Disconnecting the power cord and plugging it back will turn this LED back ON, even if the computer is still off.
- After disconnecting and reconnecting the AC power source, this LED could remain OFF if the AC power source is missing or disconnected, if the logic board is disconnected from the power supply or from the AC receptacle, or if the power supply board is faulty.

## **LED 2**

- Indicates that the computer is turned on. This LED will be ON as long as the computer is turned on (but is not asleep) and the power supply and voltage regulators are working correctly.

## **LED 3**

- Indicates that the computer and RAM are operating correctly. This LED will be ON when the computer's RAM has no issues. If LED 3 is not lit, then this indicates an issue with the built-in RAM attached to the logic board and indicates that a logic board replacement is needed.

## **LED 4**

- Indicates that the computer and LCD panel are communicating. This LED will be ON when the computer is turned on and a video signal is being generated. If LED 4 is ON and there is no image on the display, then the LCD panel or the cables between the LCD and logic board might be installed incorrectly or need replacement.

## **LED Startup Sequence**

### **LED 1 = Power is available.**

If no LED is visible:

- Disconnect the power cord from the computer and wait 15 seconds to reset the power supply and LED status. Reconnect the power cord and check the LED status again.
- Verify the AC source.
- Verify that a known-good power cord is connected.
- Verify the cable connection between the AC inlet and the power supply.
- Verify the cable connection between the power supply and the logic board.
- Verify the power supply.

### **LED 1 + LED 2 = Power is available and system is turned on.**

If the second LED is not visible when the power button is pressed:

- Verify the power button's connection to the power supply.
- Verify power button functionality.
- Verify the cable connection between the power supply and the logic board.
- Verify the power supply.
- Verify the logic board.

### **LED 1 + LED 2 + LED 3 = Power is available, system is turned on, and GPU is found.**

If the third LED is not visible after the system is turned on:

- Verify whether the boot chime is present and fans are running when turned ON (reset SMC and PRAM, verify backup battery voltage for proper startup):
  - If the POST boot chime is not heard, then go to the No Startup symptom flow.
  - If the POST boot chime is heard, then go to the No Video symptom flow.

### **LED 1 + LED 2 + LED 3 + LED 4 = Power is available, system is turned on, logic board is communicating with the GPU, and internal LCD is found.**

If the fourth LED is not visible after the computer is turned on:

- Verify the internal DisplayPort cable connections between the LCD panel and the logic board.
- Inspect the LCD display cables for cable damage.
- Verify external video functionality, and according to the result check the following items:
  - If the external display works, then verify/replace the LCD panel.
  - If the external display does not work, then verify/replace the logic board.



# Testing the Panel Using the Display Extension Cable Kit

## Testing the Panel Using the Display Extension Cable Kit for iMac (21.5-inch, Late 2012 – 2017)

Use the display extension cable kit to:

- Test the system and/or panel before securing the panel to the very high bond (VHB) adhesive strips
- Test the functionality of the panel's Embedded DisplayPort cable (eDP cable)



**Warning: HIGH VOLTAGE.** Use extreme caution when troubleshooting with the display panel removed. Avoid touching the logic board or power supply while the computer is plugged in, the power supply retains a charge whether or not the computer is on.

**After unplugging the computer from the electrical outlet, wait two minutes before removing the display panel, disconnecting modules, or substituting cables and components. This will allow the power supply and logic board time to discharge.**

- Never remove or install any physical components while the computer is plugged in to an electrical outlet.
- When plugged in, the power supply and logic board are energized, even when the computer is turned off.
- Unplug the computer and allow sufficient time for the power supply and logic board to self-discharge before removing the display panel.
- Do NOT touch the logic board or power supply while the computer is plugged in, or before sufficient time has passed to discharge stored voltage to a safe level after being unplugged.

Refer to these articles for more safety information:

- [TP833: iMac and Displays: Power Supply Cover Instructions](#)
- [TP914: iMac \(21.5-inch\): Safety](#)

### Tools

- ESD-wrist strap and mat
- Black stick
- Power supply protective covers, pack of two (923-0189)
- LCD service support stand, iMac (923-0416)
- Kit, Display Extension/Substitution Cables (076-1428)
  - iMac (21.5-inch, Late 2012)
  - iMac (21.5-inch, Early 2013)
  - iMac (21.5-inch, Late 2013)
  - iMac (21.5-inch, Mid 2014)
  - iMac (21.5-inch, Late 2015), 1.6 GHz
  - iMac (21.5-inch, 2017)
- Kit, Display Extension/Substitution Cables (076-00200)
  - iMac (Retina 4K, 21.5-inch, Late 2015)
  - iMac (21.5-inch, Late 2015), 2.8 GHz
  - iMac (Retina 4K, 21.5-inch, 2017)
- Painter's tape







**Kit 076-1428:** Use this kit with the Late 2012 to 2017 models.



**eDP Extension Cable**



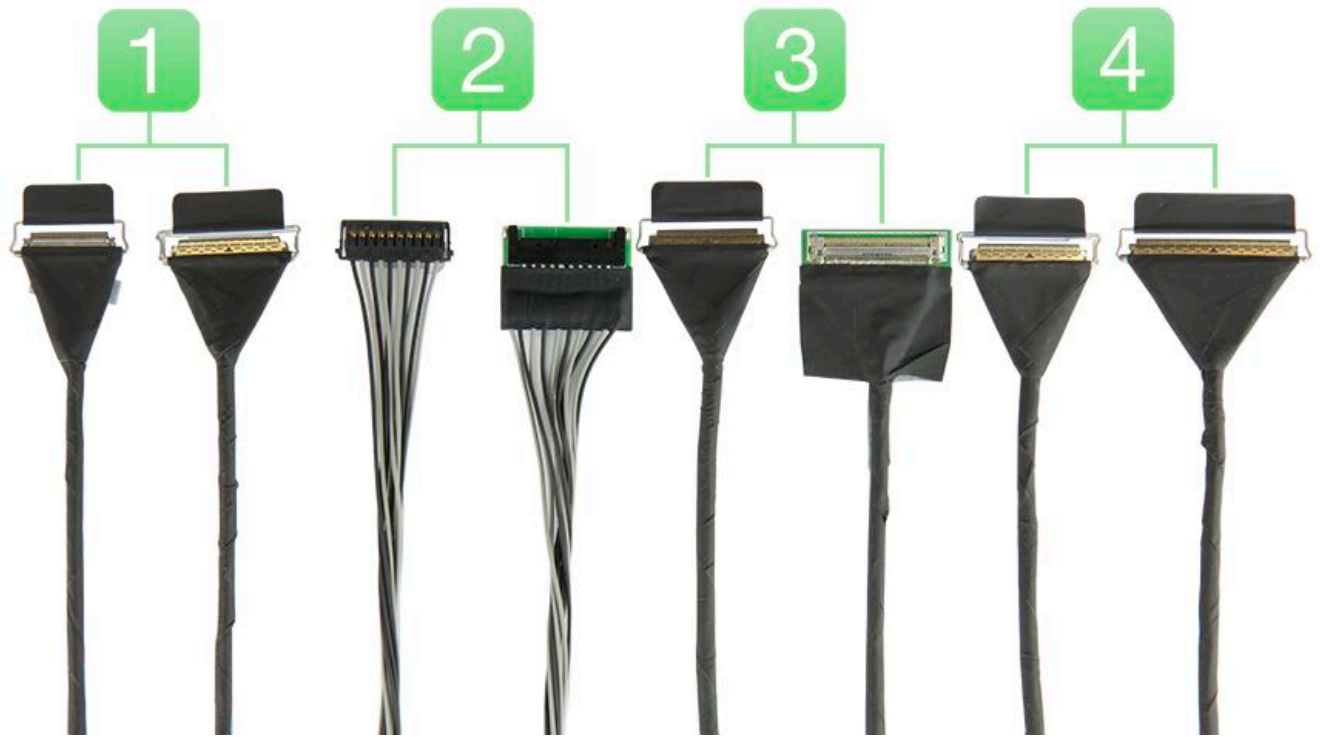
**BLC Extension Cable**



**eDP Substitution Cable**

**Kit 076-00200:** Use this kit with the Late 2015 (Retina 4K and 2.8 GHz) and later models.

1. Display substitution cable, (LCD side has 30 pins, logic board side has 40 pins), use with 2.8 GHz model
2. BLC extension cable
3. eDP extension cable
4. Display substitution cable, (LCD side has 60 pins, logic board side has 40 pins), use with Retina 4K model



### Procedure #1: Testing the System With the Panel Off, Using Extension Cables

This procedure allows you to test the system with the panel off in order to ensure everything is functioning before securing the panel with very high bond (VHB) adhesive strips.

#### First Steps

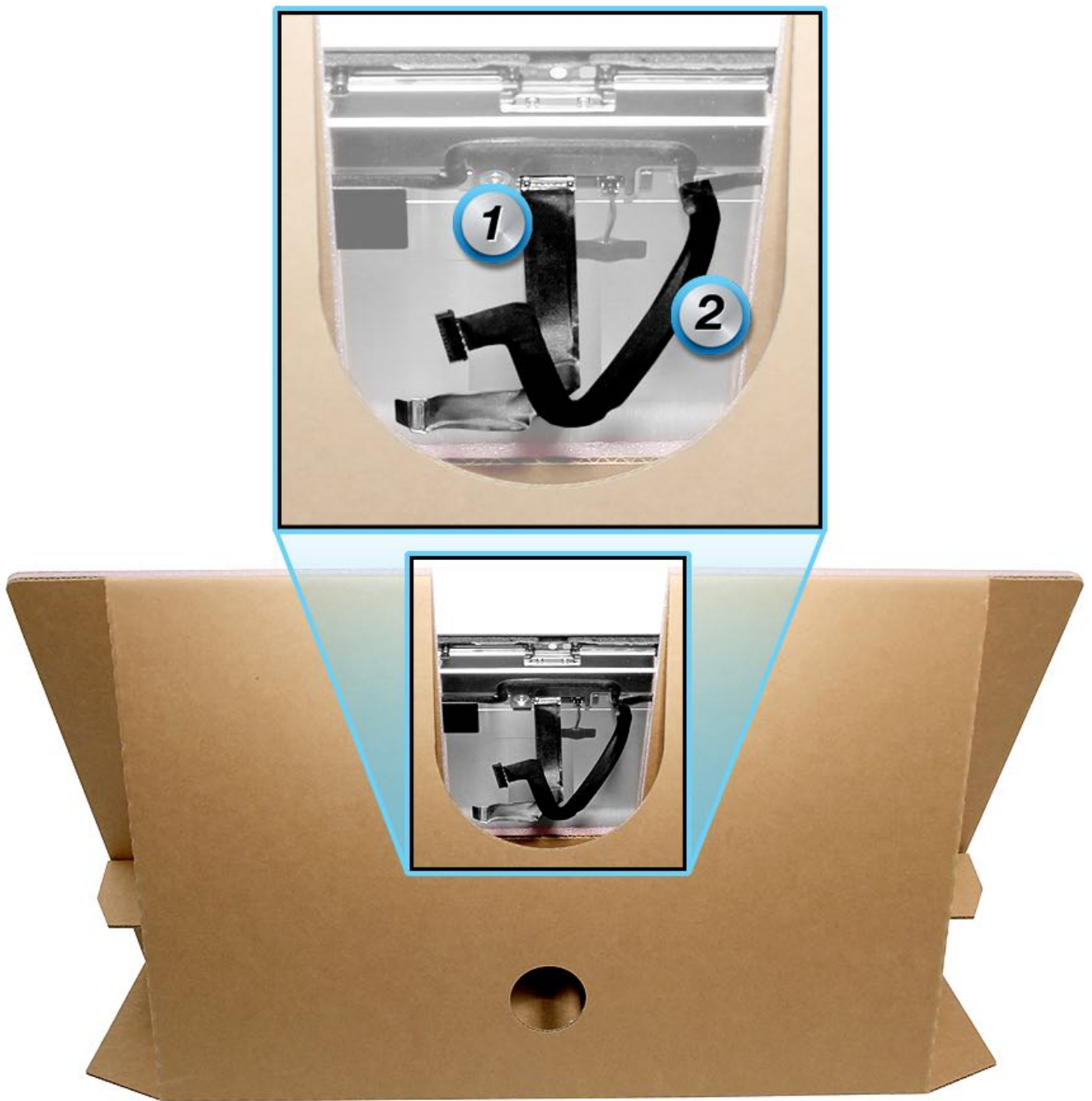
- [Display panel removal](#) (Late 2012 to Mid 2014)
- [Display panel removal](#) (Late 2015 and 2017)
- [Display panel - removing very high bond \(VHB\) strips](#) (Late 2012 to Mid 2014)
- [Display panel - removing very high bond \(VHB\) strips](#) (Late 2015 and 2017)

1. Place the LCD panel on the service support stand.





2. Orient the service support stand so the Embedded DisplayPort (eDP) cable (#1) and LCD backlight cable (#2) are facing you.



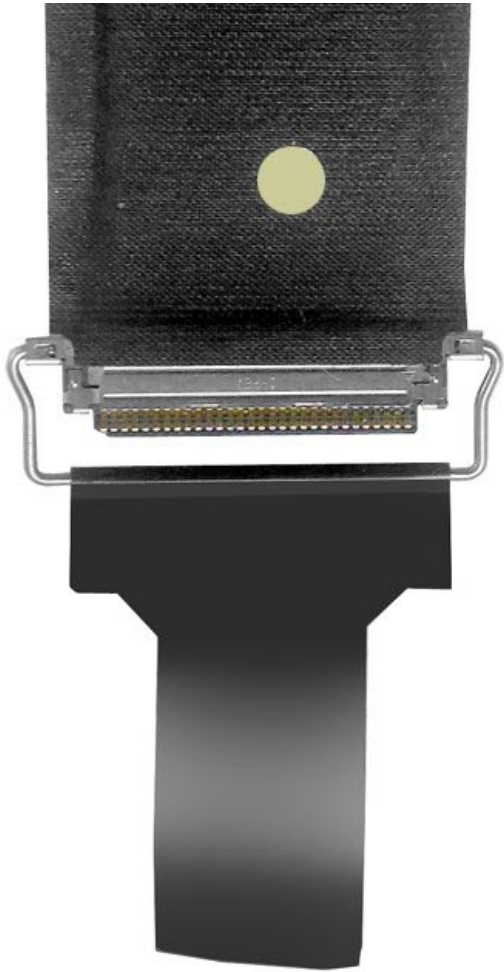
3. Locate the eDP cable in the kit. The 076-1428 eDP cable is shown below. **Note:** Cables are different between the display kits. Make sure to use the correct cable.



4. Either end of the eDP substitution cable can connect to the logic board; the other end connects to the display. **Important:** Each end of the eDP extension cable has a gold or white dot to indicate the cable orientation. Orient the cable with the **gold**

**or white dot side up** when connecting the eDP extension cable to the logic board connector and to the end of the LCD eDP cable. Connecting cables upside-down (with the brass connector facing up) will damage the logic board and/or the LCD panel. **Note:** With proper care, cables will last for approximately 50 insertions. After 50 insertions, cable degradation may occur and Apple recommends ordering a new Display Extension/Substitution Cable Kit.

**Correct orientation – gold or white dot side up**



**Incorrect orientation – brass side**



5. Flip the black tab up before connecting the eDP extension cable to the logic board connector.

**Flip tab up**



**Ready to insert**



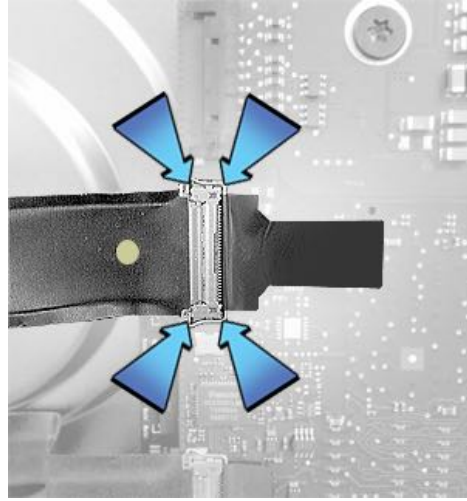
6. With the iMac unplugged, connect the extension cable to the logic board connector. The cable should be aligned straight on with the connector and never inserted at an angle. **Important:** Ensure that the black tab is attached to the locking lever on the eDP cable. Attaching the locking lever without the black tab may cause damage to the logic board and/or the LCD panel.

- Verify that each end of the cable has the gold or white dot side up.
- Check that the connector is fully seated.
- Flip the black tab over.
- Press the locking lever to secure the cable to the logic board.

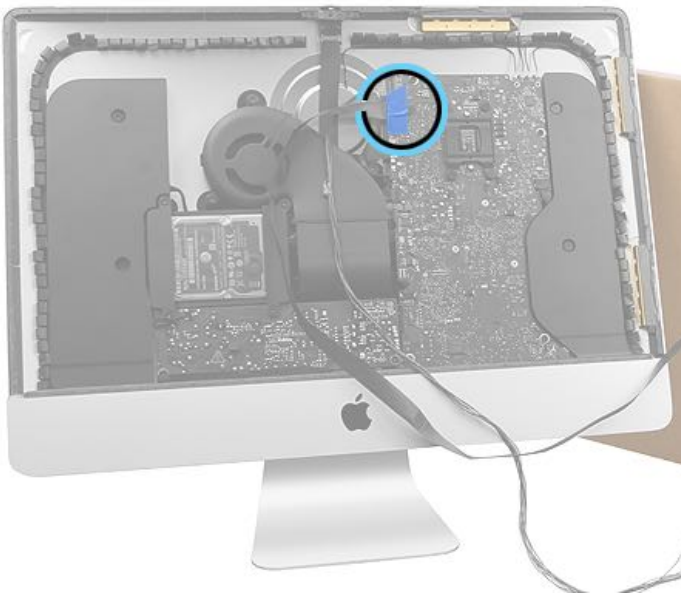
**Insert eDP extension cable into logic board connector**



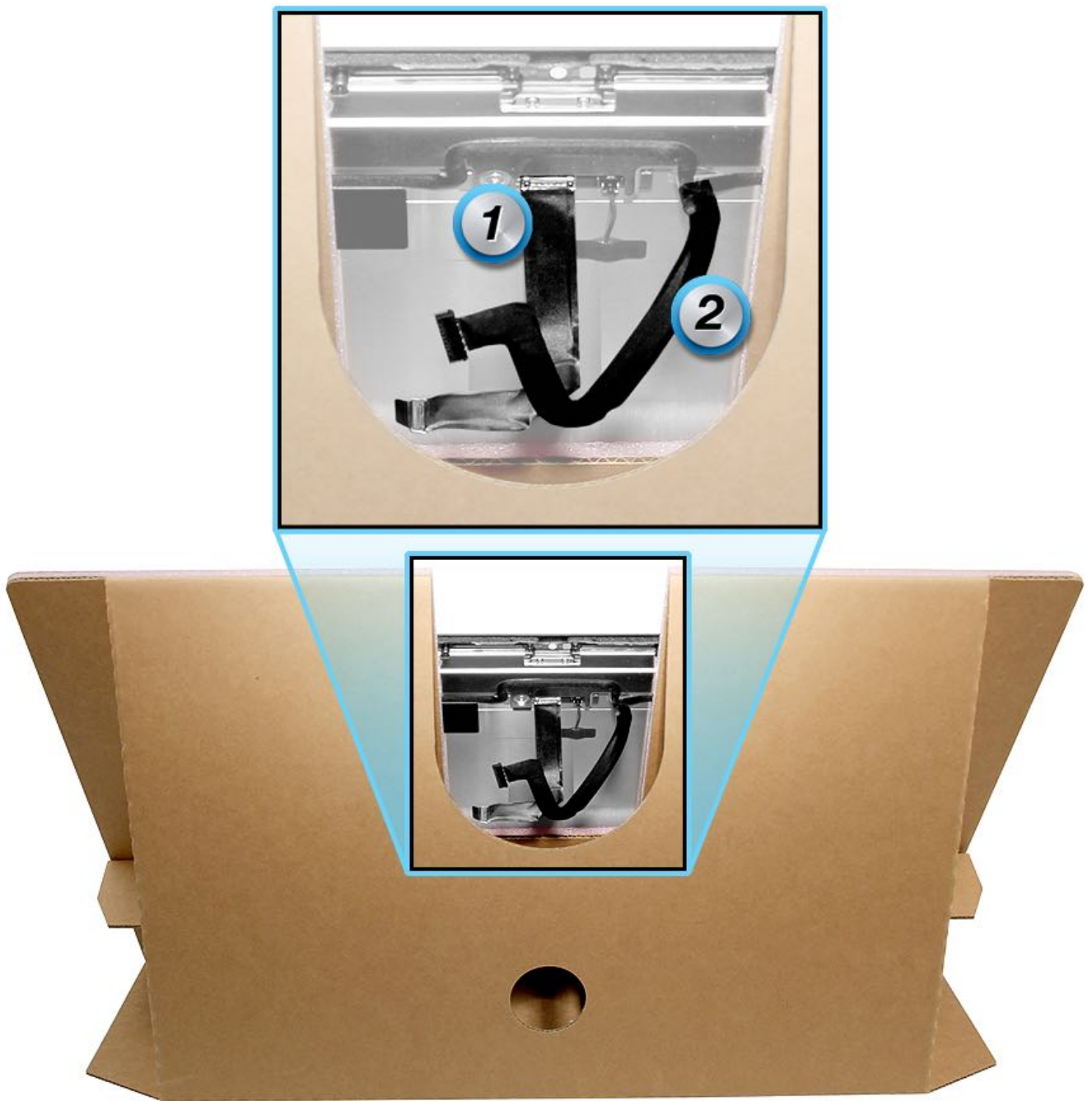
**Flip black tab and press two corners of locking lever simultaneously to secure eDP extension cable to logic board**



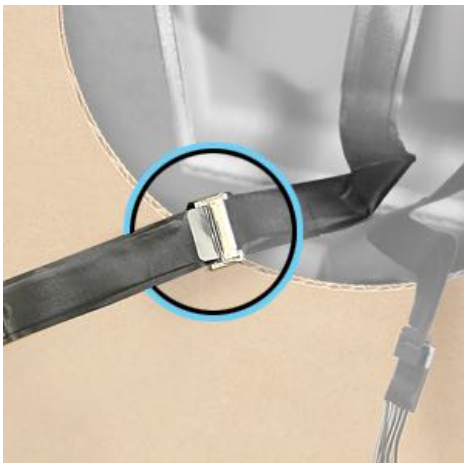
7. Secure the eDP extension cable to the logic board with painter's tape.



8. Connect the other end of the eDP extension cable to the end of the DisplayPort cable (#1).

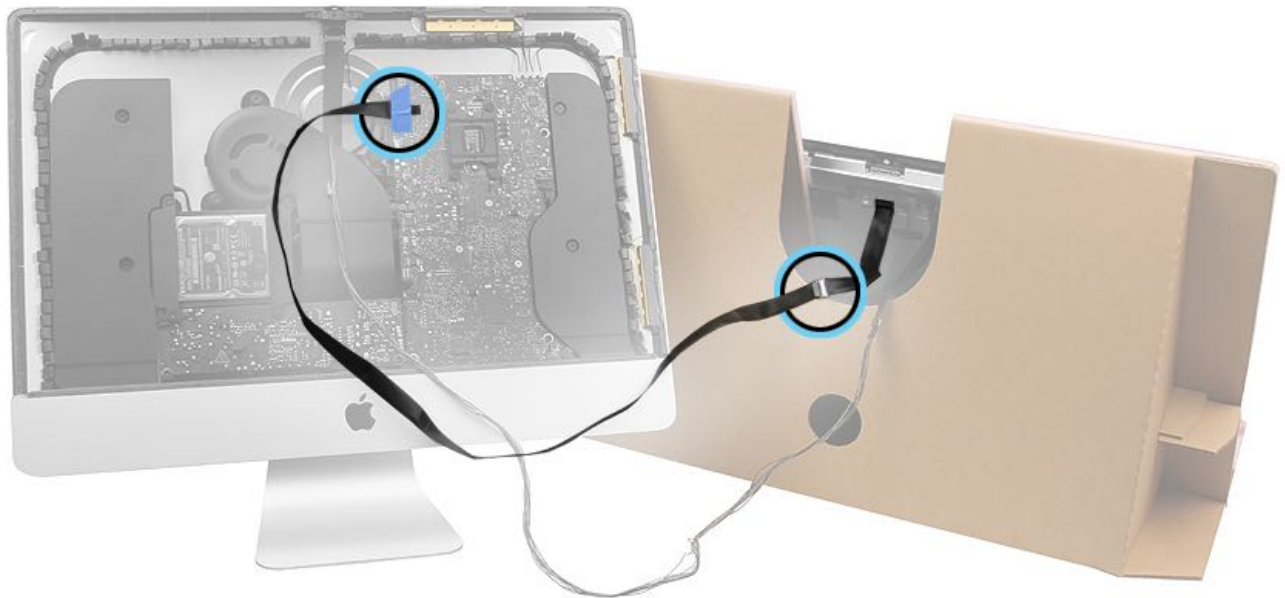


9. Securely mate the cable connectors properly. Flip the black tab over and press the locking lever bar around connector to secure cables.



10. The eDP extension cable should look like this when connected properly:

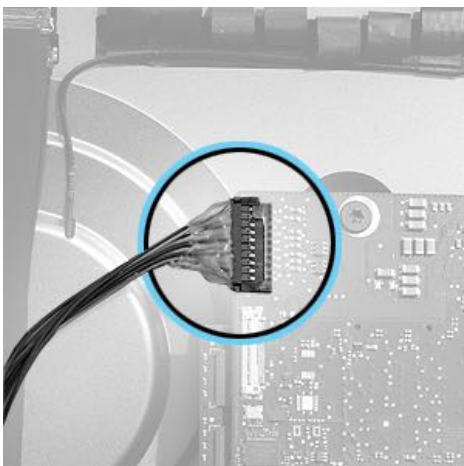




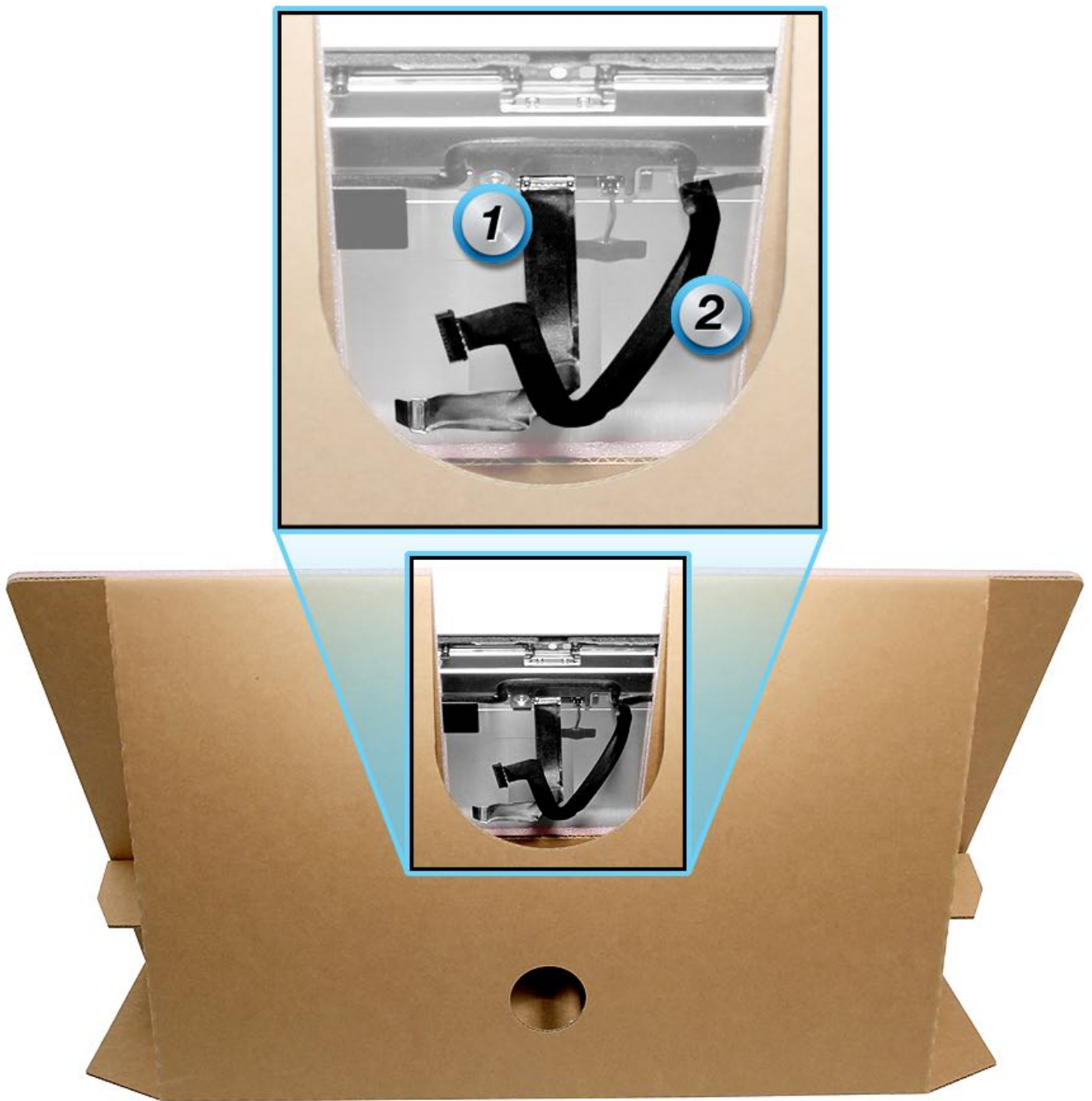
11. Next, locate the backlight extension cable (BLC). The 076-1428 extension cable is shown below. **Note:** Cables are different between the display kits. Make sure to use the correct cable.



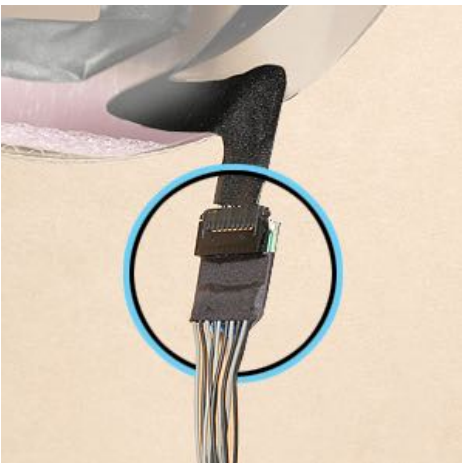
12. With the iMac unplugged, connect the backlight extension cable to the backlight connector on the logic board.



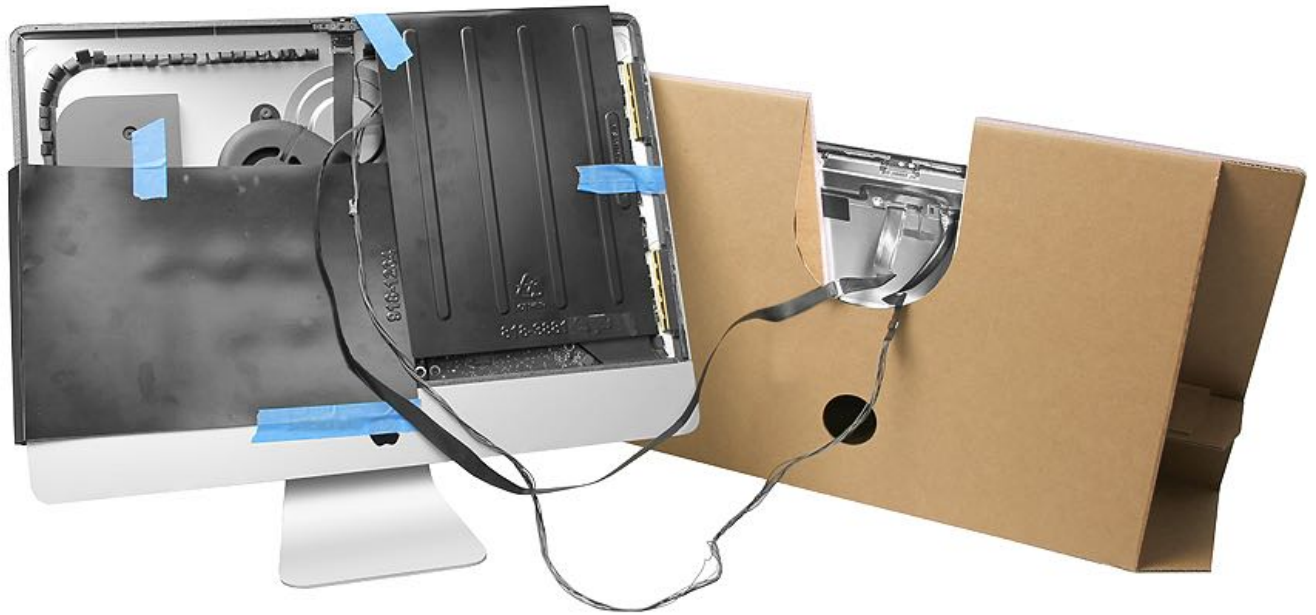
13. Connect the other end of the backlight extension cable to the end of the LCD backlight cable (#2).



14. Securely mate the backlight extension cable with the panel's backlight cable connector.



15. Locate two power supply covers. With the iMac unplugged, position one horizontally over the power supply and one vertically over the logic board and cables. Tape the power supply covers securely to the rear housing. Proper eDP and backlight extension cable setup is shown below.



16. Attach the power cord to the iMac and start up the system to verify system functionality.

## Procedure #2: Testing the Panel with the eDP Substitution Cable

This procedure tests an eDP cable to determine whether the issue is with the eDP cable. Remove the “suspect” eDP cable from the circuit and replace it with the eDP substitution cable.

### First Steps

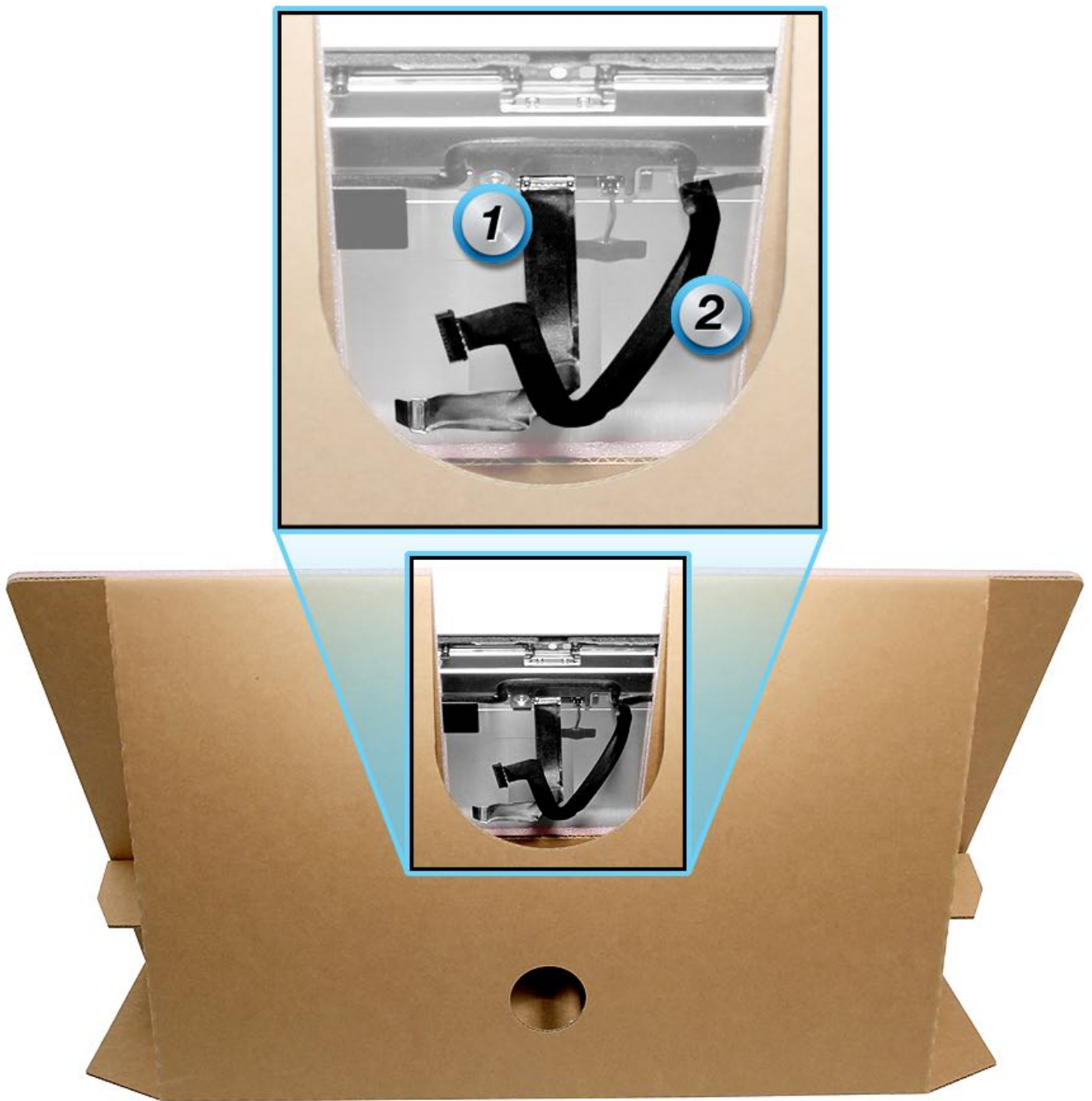
- [Display panel removal](#) (Late 2012 to Mid 2014)
- [Display panel removal](#) (Late 2015 and 2017)
- [Display panel - removing very high bond \(VHB\) strips](#) (Late 2012 to Mid 2014)
- [Display panel - removing very high bond \(VHB\) strips](#) (Late 2015 and 2017)

1. Place the LCD panel on the service support stand.

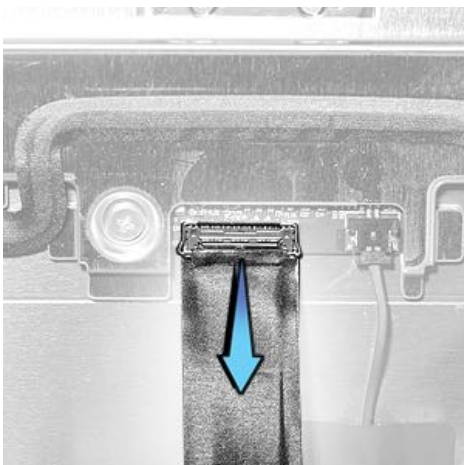




2. Orient the service support stand so the eDP cable (#1) and LCD backlight cable (#2) are facing you.



3. Disconnect the eDP cable from the connector on the LCD panel. Use your fingernail to flip the locking lever bail. Pull the cable out of the connector.



4. Locate the eDP substitution cable. The 076-1428 eDP cable is shown below. **Note:** Cables are different between the display kits. Make sure to use the correct cable.



5. Either end of the eDP substitution cable can connect to the logic board; the other end connects to the display. **Important:** Each end of the eDP substitution cable has a gold or white dot to indicate cable orientation. Orient the cable **gold or white dot side up** when connecting the eDP substitution cable to the logic board and to the connector on the LCD panel. Connecting the cable upside-down (with the brass connector facing you) will damage the logic board and/or the LCD panel. **Note:** With proper care, cables will last approximately 50 insertions. After 50 insertions, cable degradation may occur and Apple recommends ordering a new Display Extension/Substitution Cable Kit.

**Correct orientation – gold dot side up**



**Incorrect orientation – brass side**



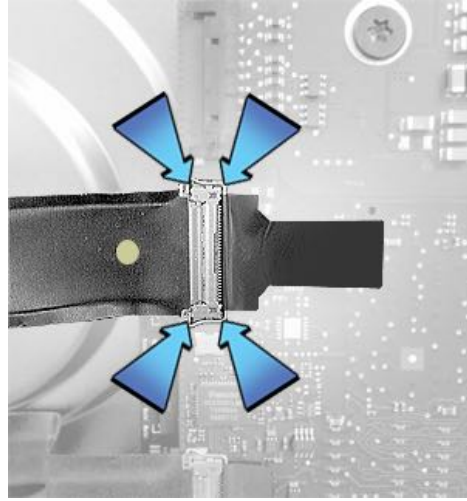
6. With the iMac unplugged, connect one end of eDP substitution cable to the connector on the logic board. The cable should be aligned straight on with the connector and never inserted at an angle. **Important:** Ensure the black tab is attached to the locking lever on the eDP cable. Attaching the locking lever without the black tab may cause damage to the logic board and/or the LCD panel.

- Verify that each end of the cable has the gold or white dot side up.
- Check that the connector is fully seated.
- Flip the black tab to the right.
- Press the locking lever to secure the cable to the logic board.

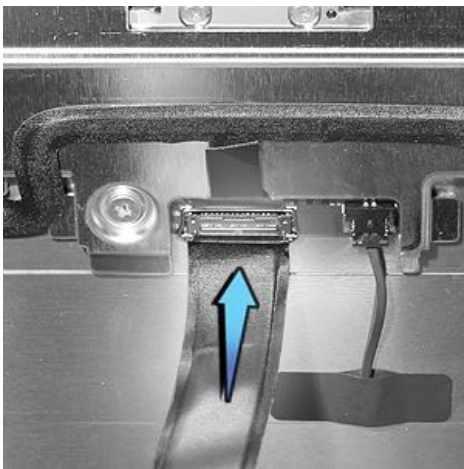
Insert eDP extension cable into logic board connector



Flip black tab and press two corners of locking lever simultaneously to secure eDP extension cable to logic board



7. Connect the other end of the eDP substitution cable to the eDP connector on the back of the LCD panel. Flip the black tab up and press the locking lever bar to secure the cable to the connector on the panel.

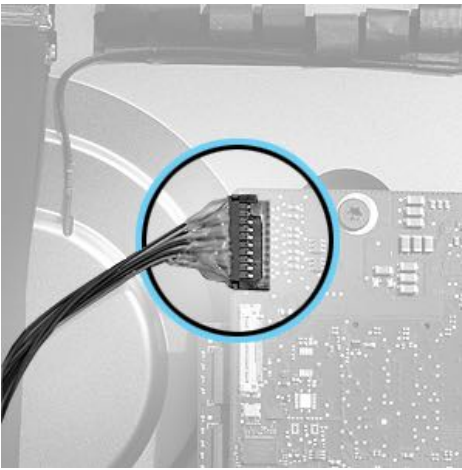


8. Locate the backlight extension cable (BLC). The 076-1428 BLC extension cable is shown below. **Note:** Cables are different between the display kits. Make sure to use the correct cable.

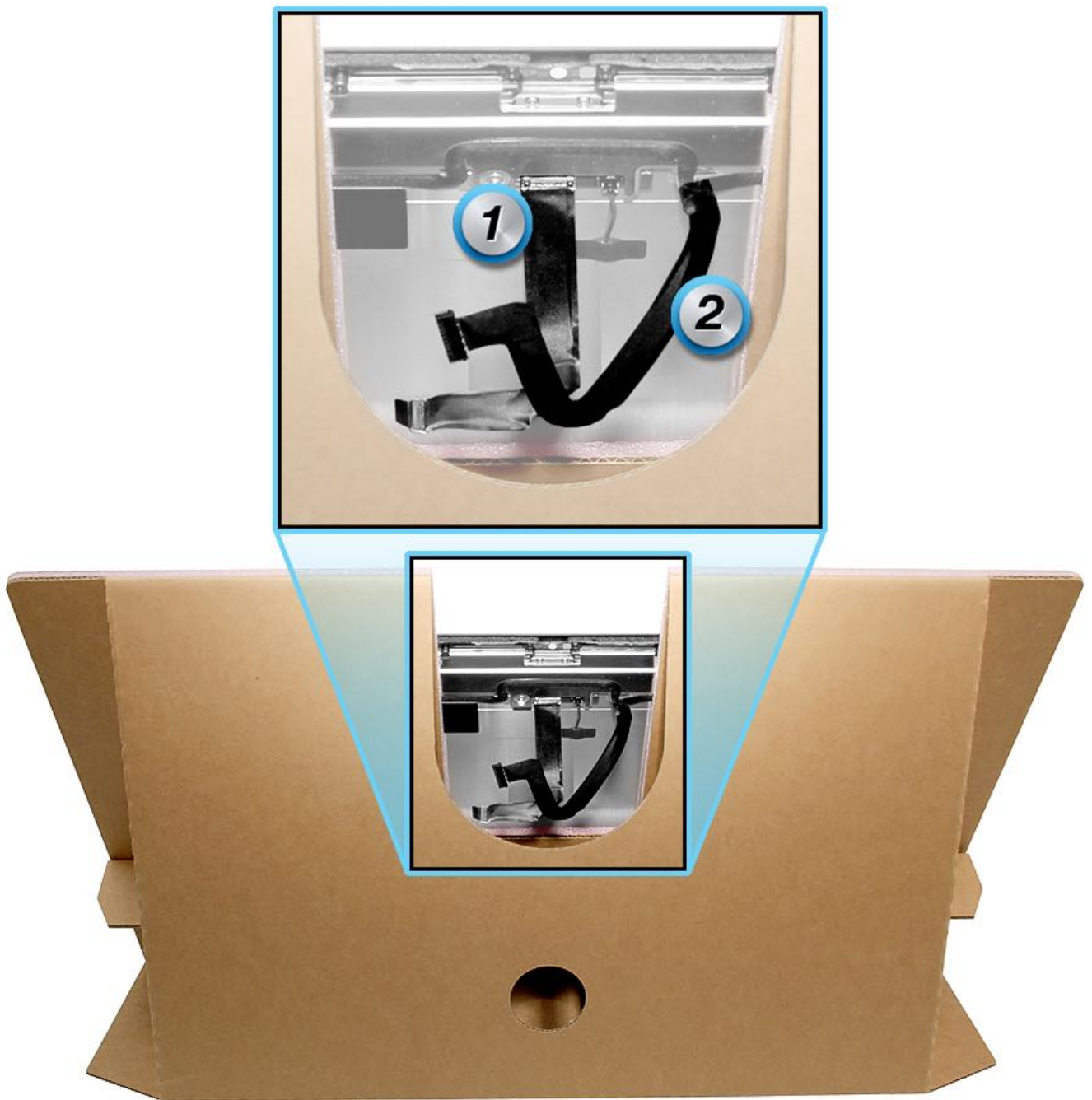


9. With the iMac unplugged, connect the backlight extension cable to the backlight connector on the logic board.





10. Connect the other end of the backlight extension cable to the dangling end of the LCD backlight cable (#2).



11. Securely mate the BLC extension cable with the panel's backlight cable connector.



12. Locate the two power supply covers. With the iMac unplugged, position one horizontally over the power supply and one vertically over the logic board and cables. Tape the power supply covers securely to the rear housing. The image below shows proper cable setup for the eDP substitution cable and backlight extension cable.

13. Attach the power cord to the iMac and start up the system to verify eDP cable functionality.

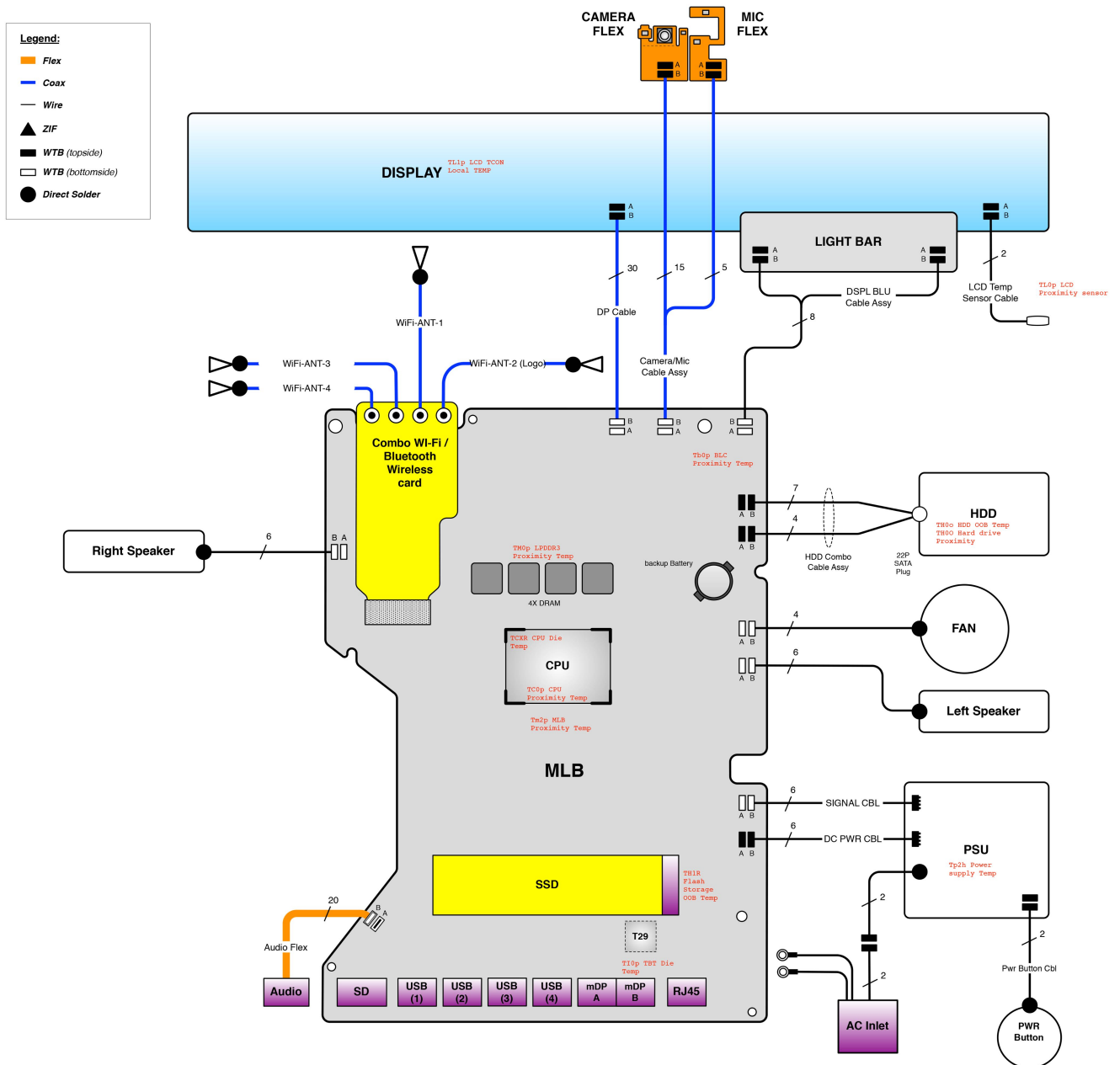


# Interconnect Diagram

## Interconnect Diagram for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

Thermal sensors and cable connector locations are shown below.

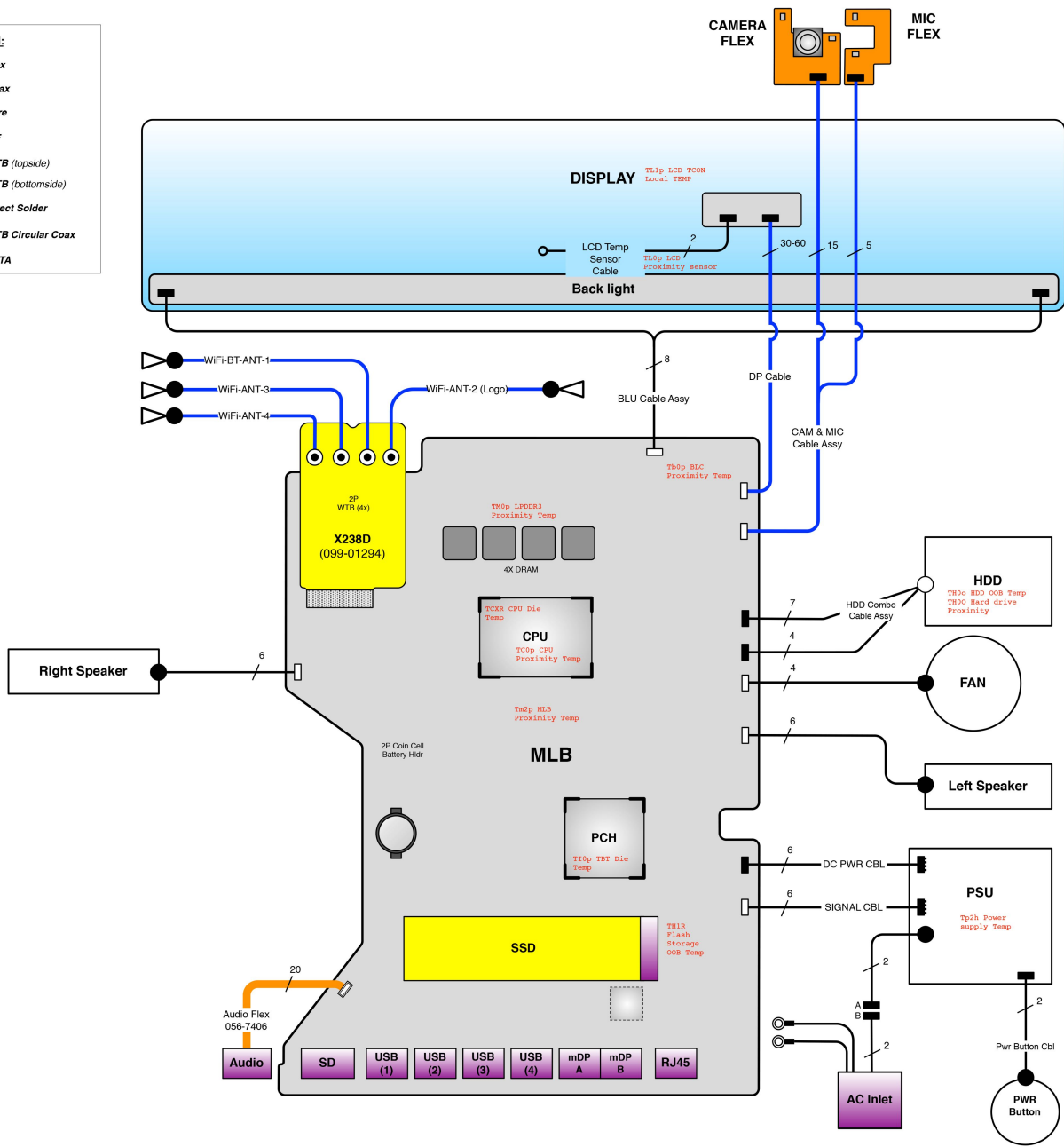
### iMac (21.5-inch, Late 2015)



### iMac (Retina 4K, 21.5-inch, Late 2015)

**Legend:**

- Flex
- Coax
- Wire
- ZIF
- WTB (topside)
- WTB (bottomside)
- Direct Solder
- WTB Circular Coax
- SATA



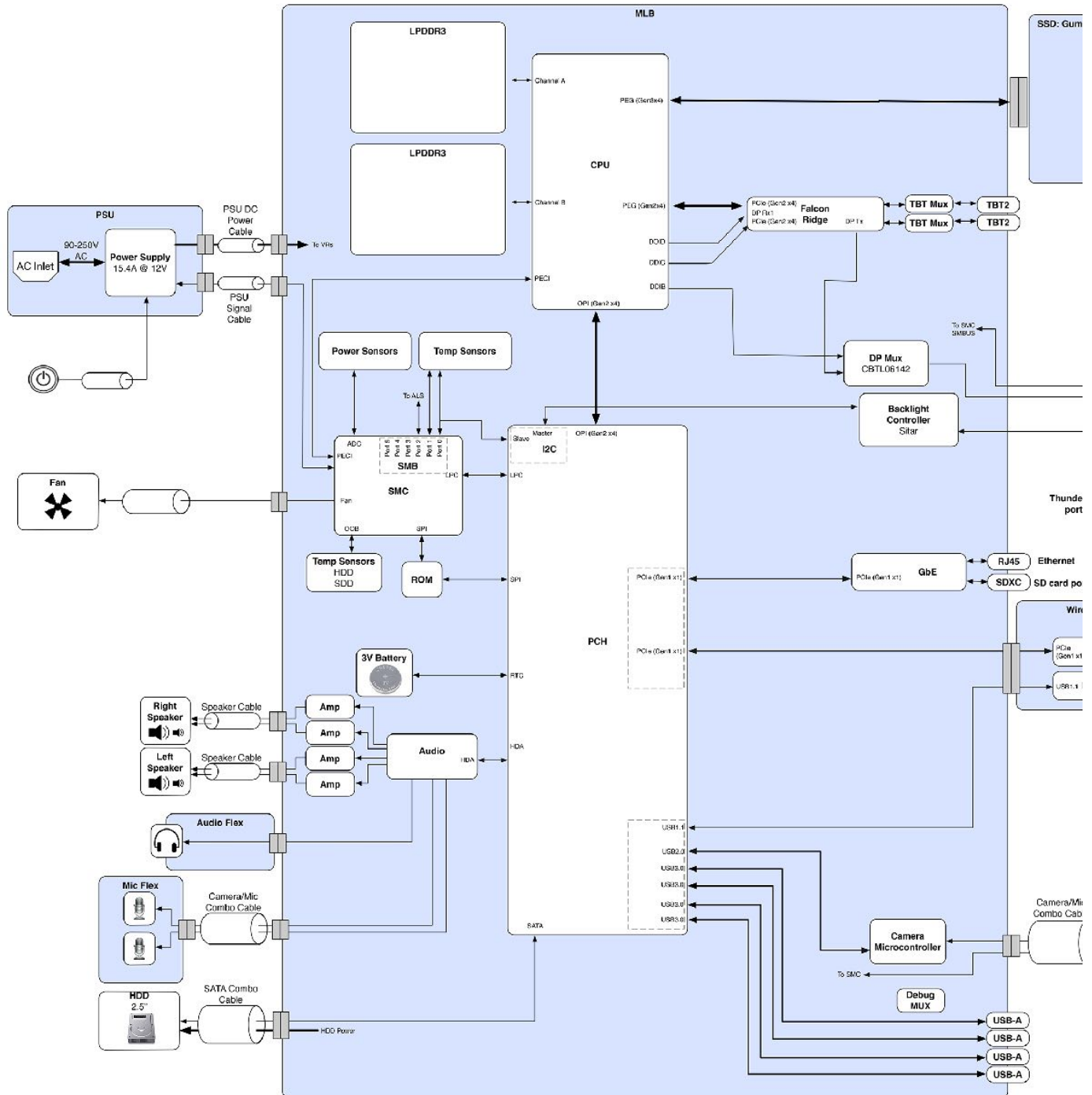


## Block Diagram

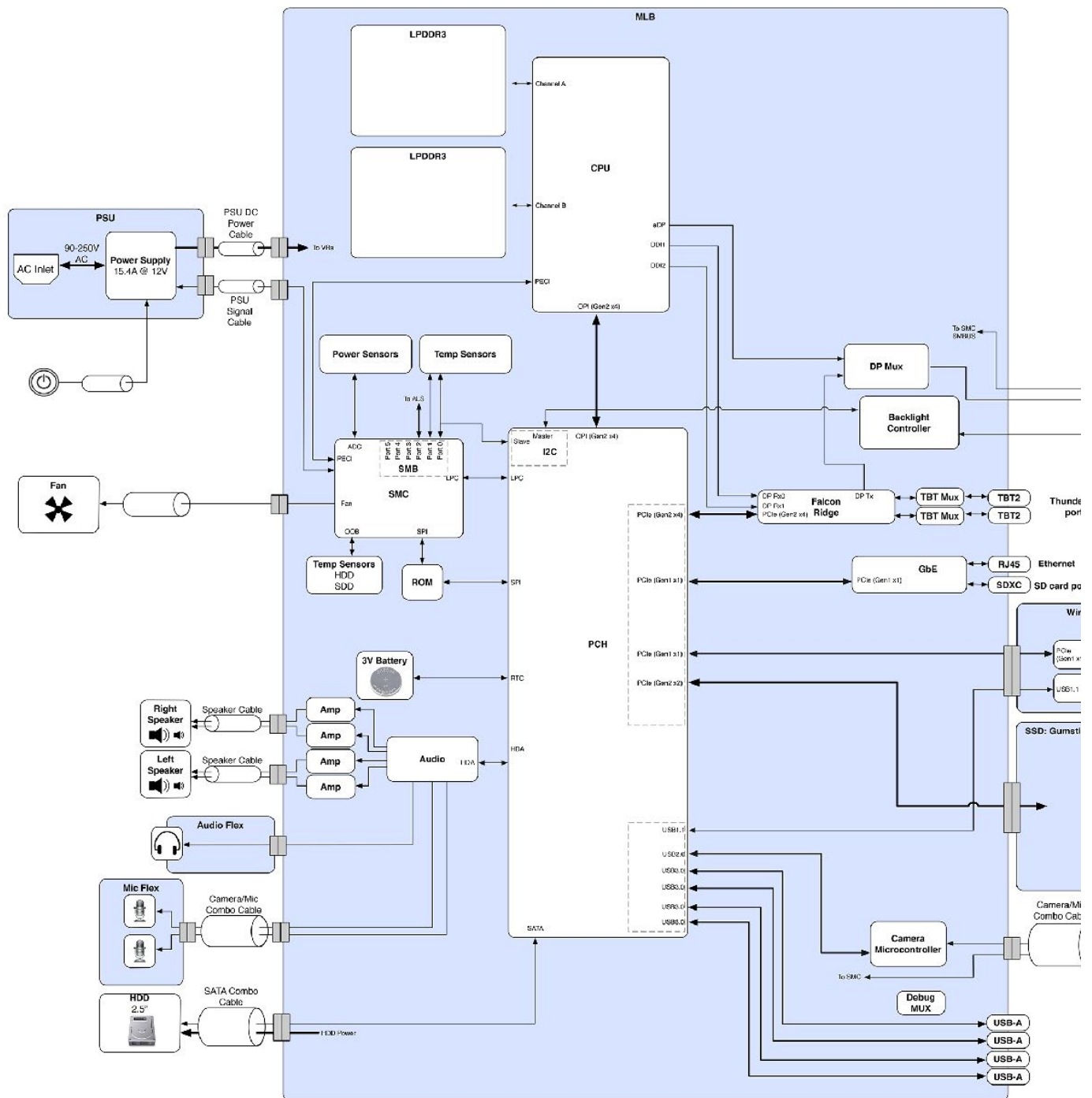
### Block Diagram for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

Refer to this diagram to see how modules are interrelated.

### iMac (21.5-inch, Late 2015)



**iMac (Retina 4K, 21.5-inch, Late 2015)**

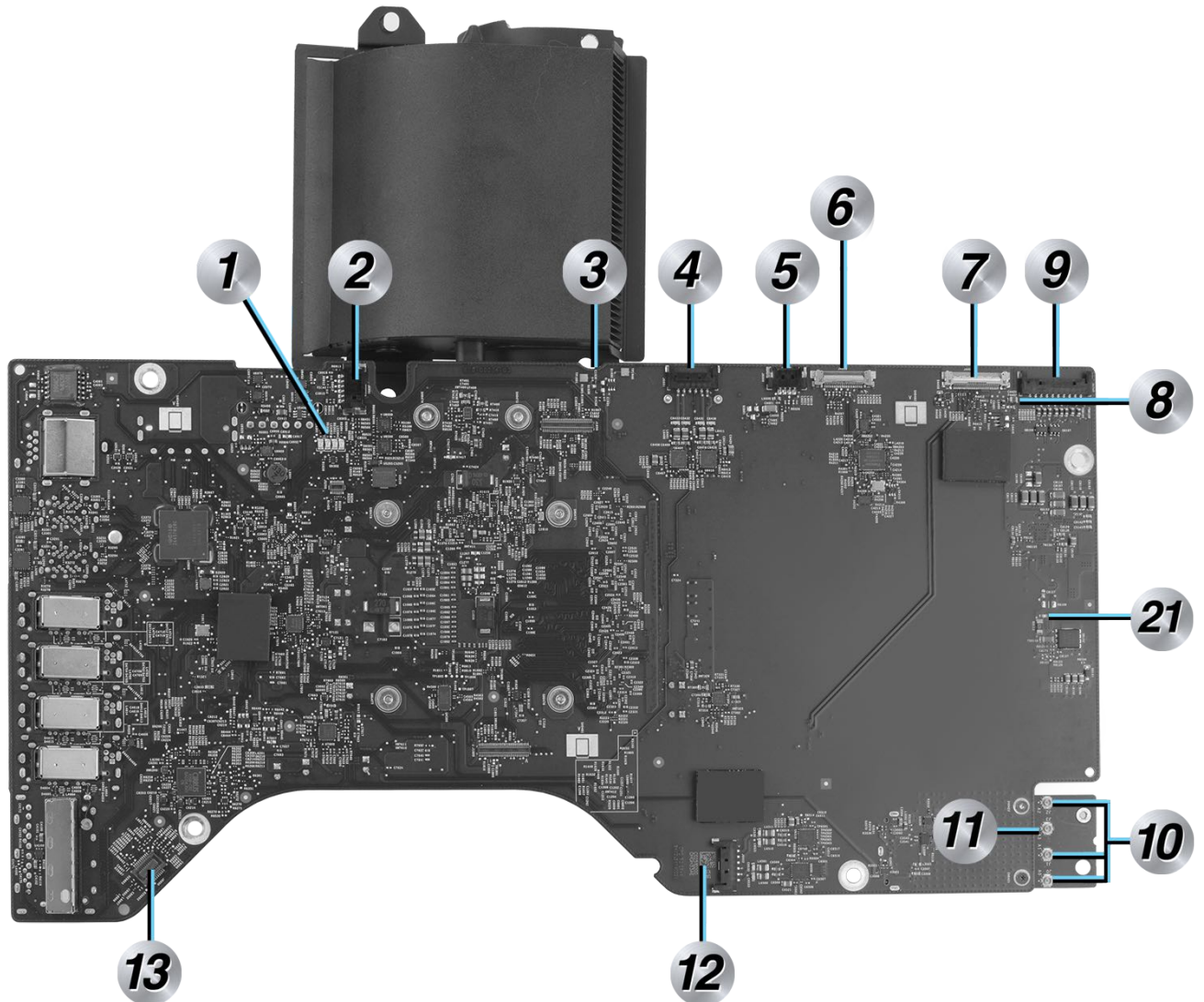


# Functional Overview

## Functional Overview for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

### Front of iMac (21.5-inch, Late 2015) Logic Board

Refer to this diagram for symptoms related to connectors on the front of the logic board.



#### 1 = Diagnostic LEDs 1-4

- Use to confirm:
- AC input voltage (trickle power present)
- power supply DC output voltage
- display panel is connected

#### 2 = Power-on Signal + Power Supply Temp Sensor

- no power on
- intermittent shutdown (if cable is pinched or damaged)

#### 3 = Backup Battery Test Points

- Use to measure 3V DC backup battery coin voltage

#### 4 = Left Speaker

- no sound from left speaker
- distorted left sound

**5 = CPU Blower Fan**

- system shutdown if fan is disconnected or blocked
- system freezes or kernel panic
- noisy fan perception

**6 = Camera + Camera LED + Microphone + Ambient Light Sensor**

- no camera function
- no LED when camera is on
- no microphone function

**7 = DisplayPort**

- poor/no video on internal display

**8 = Display Fuse (F4400)**

- poor/no video on internal display

**9 = Display Power (Backlight Control)**

- no LED backlight on internal display

**10 = Wi-Fi Antennas**

- poor/no Wi-Fi signal strength

**11 = Bluetooth Antenna**

- poor/no Bluetooth signal strength

**12 = Right Speaker**

- no sound from right speaker
- distorted right sound

**13 = Audio Input/Output**

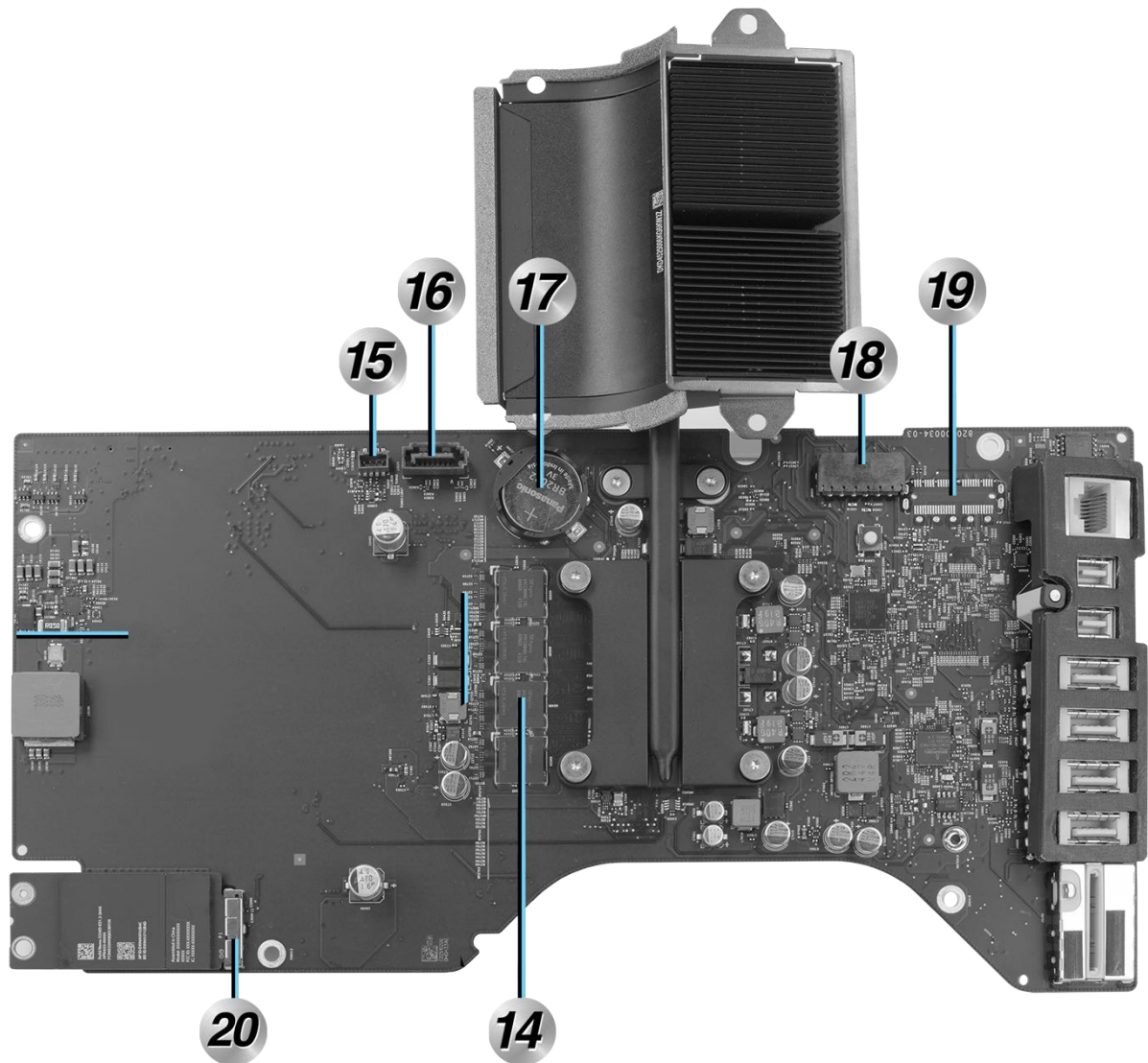
- no external optical
- no analog audio input or output

**21 = Backlight Fuse (F8100)**

- no backlight on internal display

**Back of iMac (21.5-inch, Late 2015) Logic Board**

Refer to this diagram for symptoms related to connectors on the back of the logic board.



**14 = Memory**

- no boot
- beep tones on startup
- freezes or kernel panics

**15 = SATA Hard Drive Power**

- no SATA hard drive seen on SATA bus
- no boot from hard drive or Fusion Drive

**16 = SATA Hard Drive Data**

- no SATA hard drive seen on SATA bus
- no boot from hard drive

**17 = Backup Battery**

- no video
- beep tones on startup

**18 = DC Power In**

- no power

**19 = SATA Express Flash Storage Data + Power**

- no flash storage seen on SATA Express Bus
- no boot from flash storage or Fusion Drive

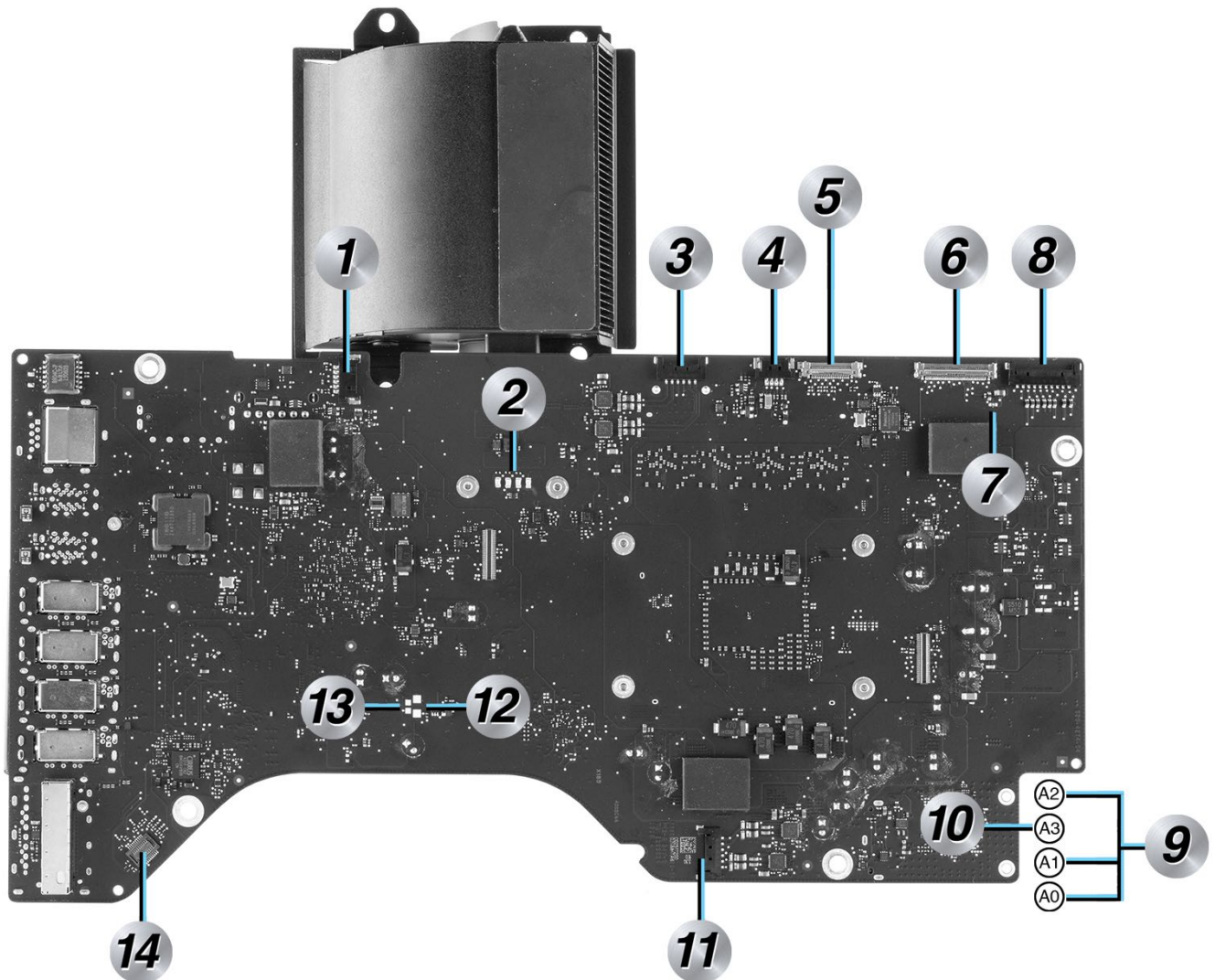
**20 = Wireless Card**



- cannot turn on Wi-Fi and/or Bluetooth
- Wi-Fi wireless card not seen in System Info > Network > Wi-Fi
- Bluetooth wireless card not seen in System Info > USB

### Front of iMac (Retina 4K, 21.5-inch, Late 2015) Logic Board

Refer to this diagram for symptoms related to connectors on the front of the logic board.



#### 1 = Power-on Signal + Power Supply Temp Sensor

- no power on
- intermittent shutdown (if cable is pinched or damaged)

#### 2 = Diagnostic LEDs 1-4

- Use to confirm: AC input voltage (trickle power present)
- power supply DC output voltage
- display panel is connected

#### 3 = Left Speaker

- no sound from left speaker
- distorted left sound

#### 4 = CPU Blower Fan

- system shutdown if fan is disconnected or blocked
- system freezes or kernel panic
- noisy fan perception

#### 5 = Camera + Camera LED + Microphone + Ambient Light Sensor

- no camera function
- no LED when camera is on
- no microphone function

#### **6 = DisplayPort**

- poor/no video on internal display

#### **7 = Display Fuse (F4400)**

- poor/no video on internal display

#### **8 = Display Power (Backlight Control)**

- no LED backlight on internal display

#### **9 = Wi-Fi Antennas**

- poor/no Wi-Fi signal strength

#### **10 = Bluetooth Antenna**

- poor/no Bluetooth signal strength

#### **11 = Right Speaker**

- no sound from right speaker
- distorted right sound

#### **12 = Backup Battery Test Points**

- Use to measure 3V DC backup battery coin voltage

#### **13 = Reset Test Points**

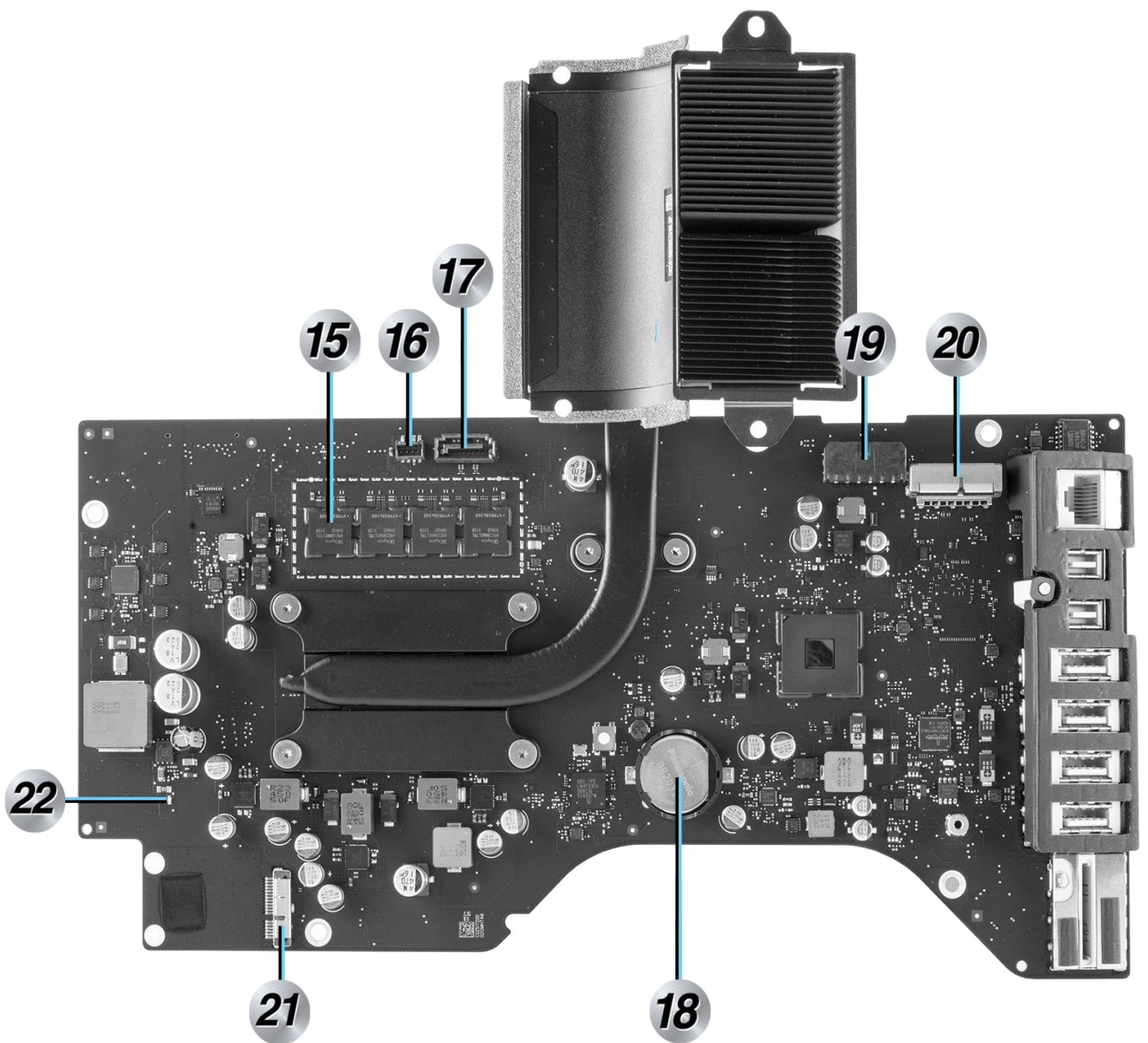
- Short across to reset real-time clock (RTC)

#### **14 = Audio Input/Output**

- no external optical/analog audio input or output

### **Back of iMac (Retina 4K, 21.5-inch, Late 2015) Logic Board**

Refer to this diagram for symptoms related to connectors on the back of the logic board.



**15 = Memory**

- no boot
- beep tones on startup
- freezes or kernel panics

**16 = SATA Hard Drive Power**

- no SATA hard drive seen on SATA bus
- no boot from hard drive or Fusion Drive

**17 = SATA Hard Drive Data**

- no SATA hard drive seen on SATA bus
- no boot from hard drive

**18 = Backup Battery**

- no video
- beep tones on startup

**19 = DC Power In**

- no power

**20 = SATA Express Flash Storage Data + Power**

- no flash storage seen on SATA Express bus



- no boot from flash storage or Fusion Drive

#### **21 = Wireless Card**

- cannot turn on Wi-Fi and/or Bluetooth
- Wi-Fi wireless card not seen in System Info > Network > Wi-Fi
- Bluetooth wireless card not seen in System Info > USB

#### **22 = Backlight Fuse (F8100)**

- no backlight on internal display

# Required Tools

## Required Tools for iMac (Late 2012 – 2017) Models

The following tools are required to service these models:

- iMac (21.5-inch, Late 2012, Early 2013, Late 2013, Mid 2014, Late 2015, 2017)
- iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)
- iMac (27-inch, Late 2012 and Late 2013)
- iMac (Retina 5K, 27-inch, Late 2014, Mid 2015, Late 2015, 2017)

For more information about tools, refer to article [OP101: Apple notebooks and desktops: Hand Tools for Repairs](#).

## General Tools

- ESD-safe workstation, including an ESD mat and wrist or heel strap
- ESD bags, to store ESD-sensitive parts while removed from the computer
- Black stick or other nonconductive nylon or plastic flat-bladed tool
  - Black stick, pack of 4 (922-5065)
  - Black stick, pack of 24 (922-9004)
  - Black stick, pack of 96 (922-9005)
- Digital volt meter, for troubleshooting
- Earphones, for audio cable reassembly
- Kapton tape
- Magnifying glass, for reading the serial number
- Pentalobe driver (923-0367), for VESA mount
- Phillips #00 screwdriver
- Sticky notes
- Thunderbolt and USB cables, for logic board replacement
- Torx T4 screwdriver (magnetized)
- Torx T5 screwdriver (magnetized)
- Torx T6 screwdriver (magnetized)
- Torx T8 screwdriver (magnetized)
- Torx T10 screwdriver (magnetized)
- Torx T25 screwdriver (magnetized), for 27-inch models

## Display Tools

The display is secured to the rear enclosure using adhesive strips. When a repair requires the removal of the display panel, the very high bond (VHB) adhesive strips must be cut and replaced.

## Display starter kit and refill kits

Model	Starter kit	Refill kit
iMac (21.5-inch, Late 2012)	076-1444	076-1437
iMac (21.5-inch, Early 2013)	076-1444	076-1437
iMac (21.5-inch, Late 2013)	076-1444	076-1437
iMac (21.5-inch, Mid 2014)	076-1444	076-1437
iMac (21.5-inch, Late 2015)	076-1444	076-1437
iMac (21.5-inch, 2017)	076-00330	076-00331
iMac (Retina 4K, 21.5-inch, Late 2015)	076-1444	076-1437
iMac (Retina 4K, 21.5-inch, 2017)	076-00330	076-00331
iMac (27-inch, Late 2012)	076-1444	076-1419
iMac (27-inch, Late 2013)	076-1444	076-1419
iMac (Retina 5K, 27-inch, Late 2014)	076-1444	076-00009
iMac (Retina 5K, 27-inch, Mid 2015)	076-1444	076-00009
iMac (Retina 5K, 27-inch, Late 2015)	076-1444	076-00009
iMac (Retina 5K, 27-inch, 2017)	076-00330	076-00332

**Display starter kit contains:**

- Display removal tool (1) (the silver handle shown here), also available separately as 076-00108
- Display removal wheels (8) (the black circle on the left side of tool shown here)

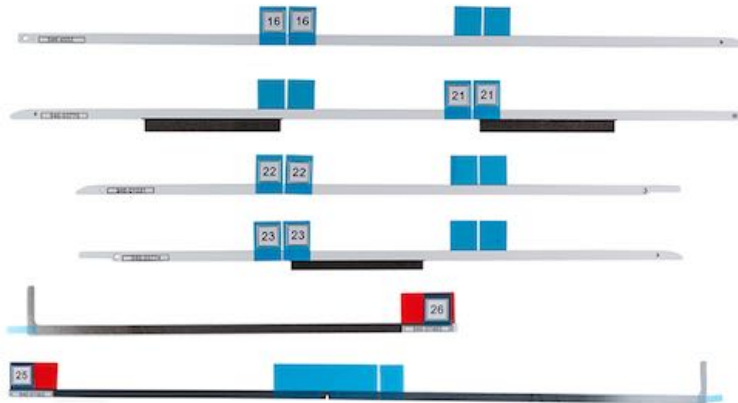


- iMac service foam locking wedge (not available separately)

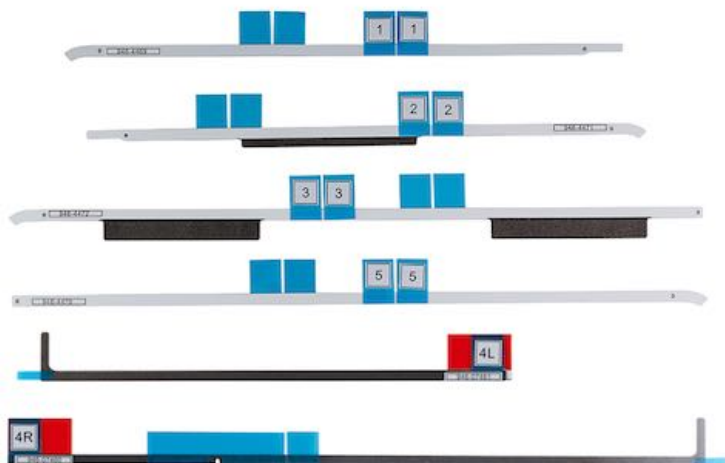
**Note:** The number on the side of the foam wedge (944-4365) is an Apple internal part number used for identification. It is not an orderable service part.



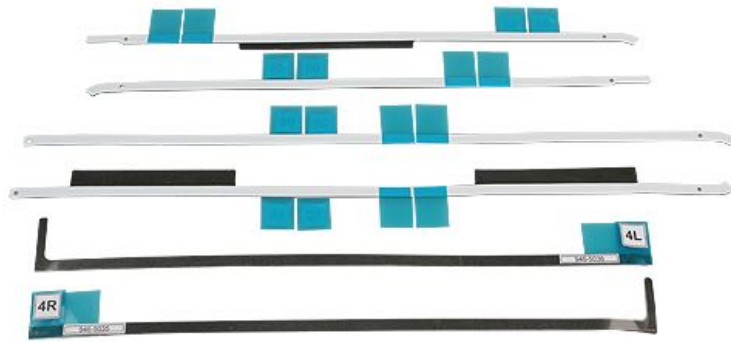
- VHB adhesive strip 6-piece set for iMac (27-inch, 2017) (4 sets)



- VHB adhesive strip 6-piece set for iMac (21.5-inch, 2017) (4 sets)



- VHB adhesive strip 6-piece set for iMac (21.5-inch, Late 2012 – Mid 2015 models)



#### Display refill kits contain:

- Display removal tool (1), also available separately as 076-00108
- Display removal wheels (20), also available separately as 076-1417
- VHB adhesive strip 6-piece set (20 sets)

#### Other display tools:

- Display cable extension kit, to test the display panel and cables with the display panel removed
  - 076-1428 for iMac (21.5-inch, Late 2012 – 2017 models)
  - 076-00200 for iMac (Retina 4K and 2.8 GHz, 21.5-inch, Late 2015 and 2017 models)
  - 076-1431 for iMac (27-inch, Late 2012 and Late 2013)
  - 076-00010 for iMac (Retina 5K, 27-inch, Late 2014, Mid 2015, Late 2015, 2017 models)
- Display removal tool (076-00108)
- Display removal wheels, pack of 20 (076-1417)
- ESD bags, 27x18-inch, pack of 5 (923-01193), for a 27-inch display
- ESD bags, 21x16-inch, pack of 5 (923-01194), for a 21.5-inch display
- Isopropyl alcohol (IPA) wipes, 95% or higher isopropyl
- LCD service support stand (923-0416), to support the LCD panel or when working on a VESA mount-adapted system



- Painter's tape (tape that does not leave a residue, 1 to 2 inches wide, but preferably 2-inch, if available)
- Polishing cloths, anti-static, optical-grade microterry, pack of 5 (922-8263)
- Power supply protective covers (923-0189), to use when performing live adjustments with the display panel removed
- Sticky silicone roller (6-inch) (922-8261), to adhere VHB strips to the display panel
- Sticky sheet pads (922-8262), to clean silicone roller or pick up shards of broken glass

#### Wireless Card Tools

- Thermal pad kit (076-1445) **Note:** Whenever you remove or replace the wireless card, check for any original thermal material. If it is present, then remove the original thermal material, clean the area with an IPA wipe, and install one thermal pad to the wireless card.
- Antenna removal tool (optional)
  - 923-01322



- Wireless card support tool
  - 923-01806 iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017)



- 923-01807 for iMac (Retina 5K, 27-inch, 2017)



- 923-00774 for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)



- 923-00775 for iMac (Retina 5K, 27-inch, Late 2015)



# Safety

## Safety for iMac (21.5-inch, Late 2012 – 2017)



**Warning: HIGH VOLTAGE.** Use extreme caution when troubleshooting with the display panel removed. Avoid touching the logic board or power supply while the computer is plugged in, the power supply retains a charge whether or not the computer is on.

**After unplugging the computer from the electrical outlet, wait two minutes before removing display panel, disconnecting modules, or substituting cables and components. This will allow the power supply and logic board time to discharge.**

- Never remove or install any physical components while the computer is plugged in to an electrical outlet.
- When plugged in, the power supply and logic board are energized, even when the computer is turned off.
- Unplug the computer and allow sufficient time for the power supply and logic board to self-discharge before removing the display panel.
- Do NOT touch the logic board or power supply while the computer is plugged in, or before sufficient time has passed to discharge stored voltage to a safe level after being unplugged.

Refer to article [TP833: iMac and Displays: Power Supply Cover Instructions](#) for additional information on installing the protective covers. The power supply cover provides protection against unintended contact with the energized power supply, which may result in injury from electric shock. ALWAYS use the protective power supply cover during service when the glass panel and LCD are removed on the iMac, LED Cinema Display, and Thunderbolt Display.

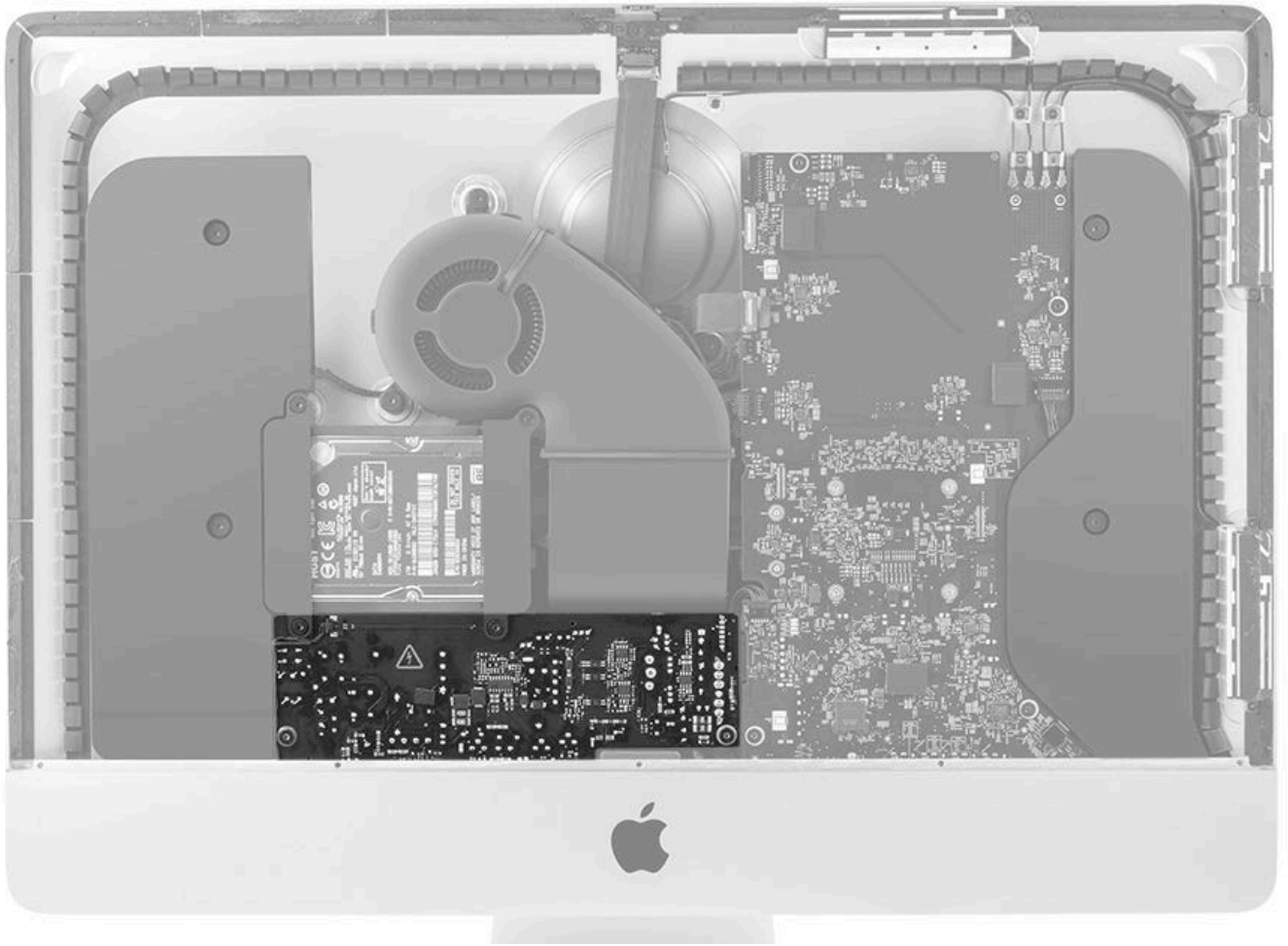
**Warning:** iMac (Late 2012 – 2017) models require two protective covers (923-0189) when performing live adjustments; one for the power supply and one for the backlight control circuitry on the logic board. Secure the covers to the rear housing with tape, as shown in the last image below.

### Electrical Safety Precautions

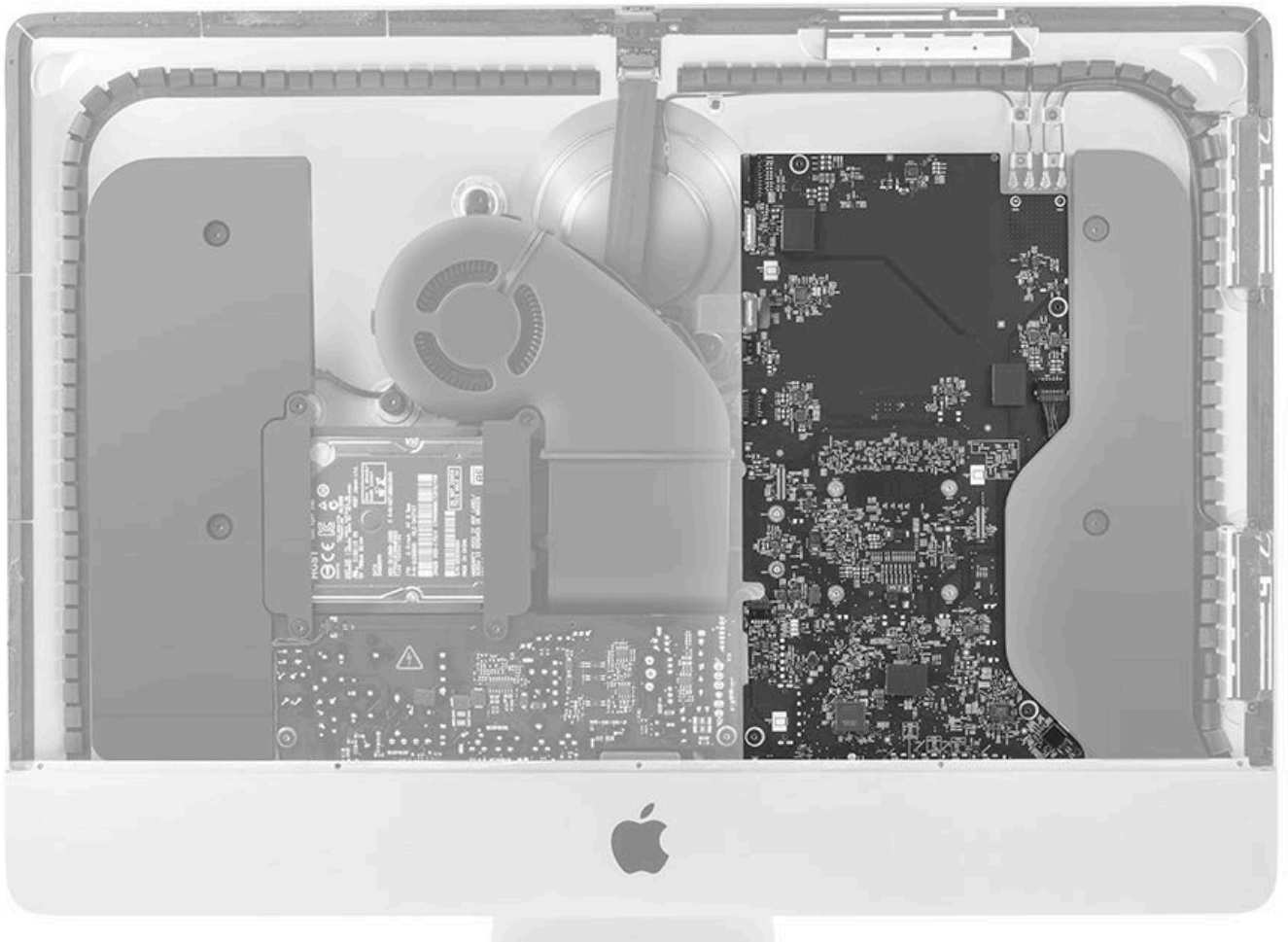
Before working on a computer with exposed, potentially energized parts:

- Remove rings, watches, necklaces, metal-rimmed eyewear, and other metallic articles which increase your risk of electric shock.
- Do not wear a cell phone or other signaling device, as these may cause a dangerous startle reflex during energized work.
- **If the iMac needs to be plugged in for LED checks or similar troubleshooting, do NOT wear an ESD wrist strap.** Wearing ESD grounding systems increases your risk of electric shock.
- Remain alert, focused on the work being performed, and aware of the proximity of grounded objects to your body.
- Use the plastic black stick or other nonmetal extension tool as needed to connect or disconnect cables, to keep fingers away from potentially energized parts.

### iMac (21.5-inch, Late 2012 – 2017): Power supply location



**iMac (21.5-inch, Late 2012 – 2017): Logic board location**



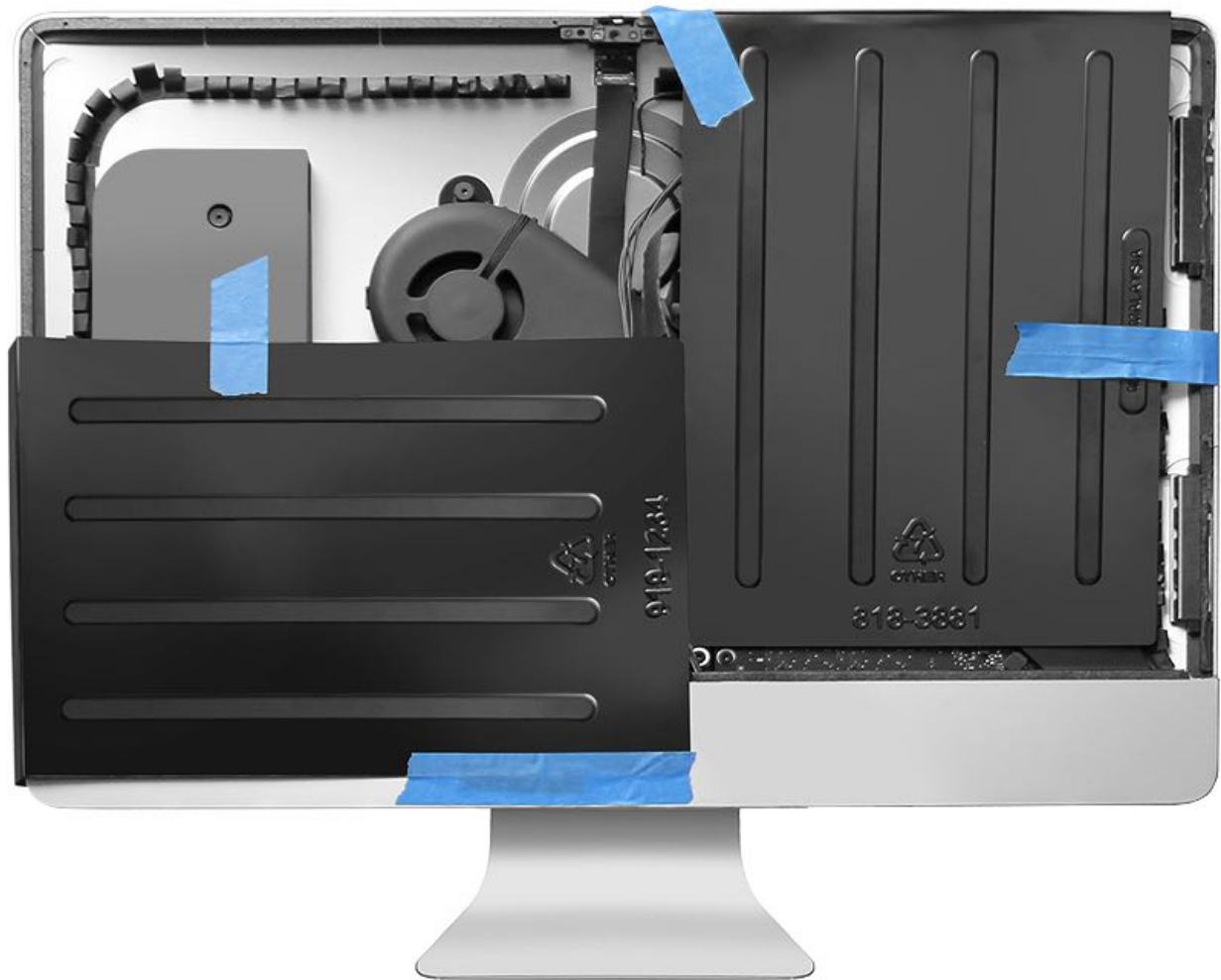


## iMac (21.5-inch, Late 2012 – 2017): Protective power supply cover placement

**Warning:** Use the protective power supply covers when the computer is plugged in or when performing live adjustments. On these models, place a cover over both the power supply and the logic board when doing live adjustments. Secure the covers to the rear housing with tape, as shown below. Avoid touching the logic board or power supply while the computer is plugged in and the display panel is removed.

Refer to articles:

- [TP833: Mac and Displays: Power Supply Cover Instructions](#)
- [TP982: Testing the Panel Using the Display Extension Cable Kit](#)



# Cleaning and Handling a Broken Display Panel

## Cleaning and Handling a Broken Display Panel for iMac (Late 2012 – 2017)

### Tools for Cleaning the Display Panel

- Safety glasses
- Service wedge (iMac) (included with the display panel starter kit, 076-1444)
- Clean, damp cloth (to clean display panel glass)
- Isopropyl alcohol (IPA) wipes (to remove residual VHB adhesive)

### Cleaning the Display Panel

1. Clean the front of the display with a clean, damp, lint-free cloth. **Note:** Do not use IPA wipes to clean the display. IPA wipes should only be used to remove residual VHB adhesive.
2. Polish the display panel with an anti-static, micro-terry, optical-grade polishing cloth (922-8263, package of five).



### Glass Safety Precautions

All models have a glass display panel that attaches to the front of the computer, which must be removed to access internal components.

### Handling a Broken Display Panel

- The display panel's glass is not tempered and will break into sharp pieces if mishandled. Removing the display panel requires special tools.
- Safety glasses are recommended when removing the display panel.

### Tools

- Display panel starter kit (076-1444)
- Material handling gloves (such as leather or cut-resistant gloves)

- Packing tape or equivalent
- Safety glasses
- Large ESD bags (922-8258) – 24x20-inch bags that accommodate a 21.5-inch display, package of five
- Large ESD bags (922-9468) – 24x30-inch bags that accommodate a 27-inch display, package of five
- Large box for disposal

## Safety Information



### If the display panel breaks and a glass shard enters the eye:

- Seek medical attention immediately!
- Do not rub your eye if you feel you have something in your eye.
- Do not use an eye wash. An eye wash can push or move the shard of glass and cause more damage.
- Keep the eye closed or loosely patch the eye to keep the eye from moving.



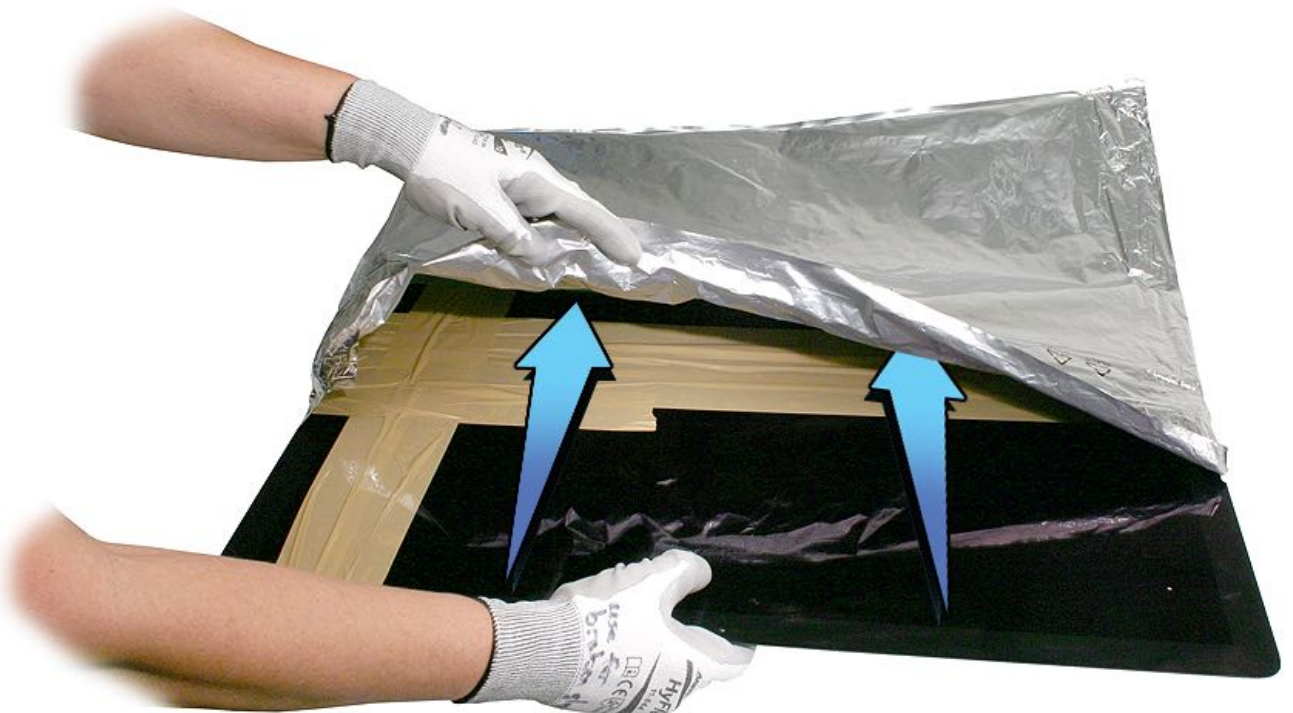
### Handling a Broken Display Panel

1. Put on safety glasses and material handling gloves.
2. If the display panel is broken and is still attached to the rear housing, then secure the broken glass with packing tape and carefully follow the Display Panel Removal procedure.
  - [RP1021: iMac \(21.5-inch, Late 2012, Early 2013, Late 2013, Mid 2014\): Display Panel Removal](#)
  - [RP1230: iMac \(21.5-inch, Late 2015 and 2017\) and iMac \(Retina 4K, 21.5-inch, Late 2015 and 2017\): Display Panel Removal](#)
  - [RP950: iMac \(27-inch\): Display Panel Removal](#)
3. Lay the display panel on a smooth, clean work surface.
4. Apply tape, thoroughly covering the broken display panel.



4.

5. Place the taped display panel in the ESD bag that the replacement panel came in (or an equivalent large bag).



6. Place the display panel inside a large box, label the box "Broken Glass," and return the display back to Apple using the normal return process.





# Take Apart Procedure Notes

## Reassembly Steps

When no replacement steps are listed, replace parts in exact reverse order of Removal procedure.

## Note About Images in This Guide

In some cases a pre-production model may have been used to document the procedures in this guide. Although there may be small differences in appearance between the image pictured and the computer you are servicing, the procedures are the same unless noted.

## Screw Sizes

All screw sizes shown are approximate and represent the total length of the screw.



# Display Panel Removal

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV116: Display Panel Removal and Replacement Video](#).

Before you begin:

- Shut down the computer.
- Unplug the power and disconnect any peripherals.
- Put on an ESD wrist strap.



## Tools

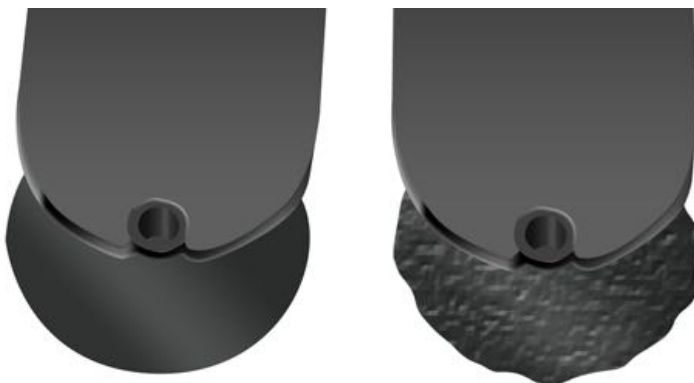
- ESD wrist strap and mat
- ESD-safe bag
- Black stick
- Display removal tool
- Replacement wheels for display removal tool (several)
- Safety glasses
- Service wedge (iMac)





The display panel must be removed for all repairs. The display is affixed to the computer housing with very high bond (VHB) adhesive strips. These VHB strips must be cut with the display removal tool in order to remove the LCD panel. Each VHB strip consists of two adhesive layers and a foam layer (VHB/foam/VHB). When you remove the display, you are cutting primarily through the foam layer.

The main tool is the display removal tool. The tool uses replaceable wheels (076-1417) that cut through the foam layer in the VHB strip. With careful use, these wheels can be reused five to ten times. If the wheel becomes nicked from contact with the chin, further use becomes difficult. Because of this, the tool should only be used along the top and sides of the display, and not along the chin. To remove the VHB strips along the chin, lower the display and pull the outer vertical tab on the strips.



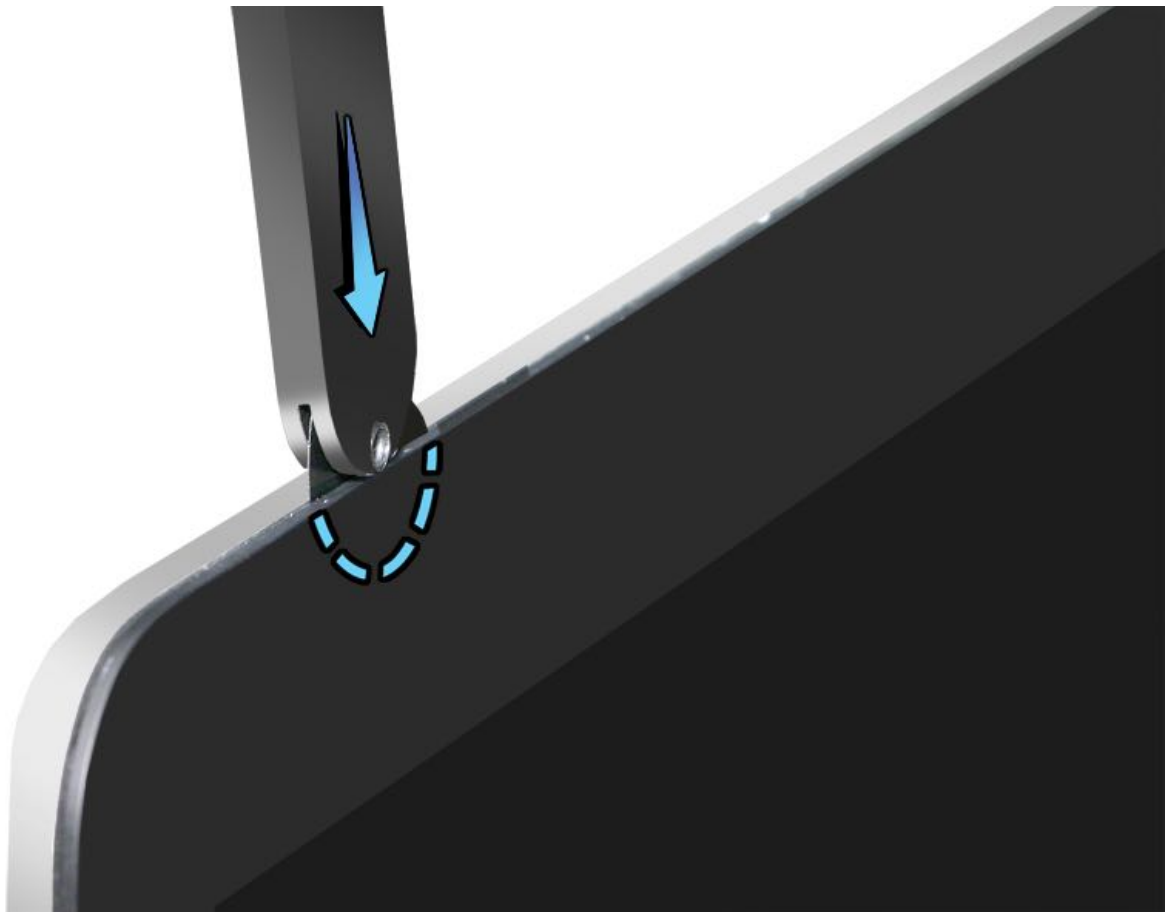
## Steps For Removal

**Important:** In the unlikely event that the display glass cracks or breaks, refer to article [TP819: Cleaning and Handling a Broken Display Panel](#).

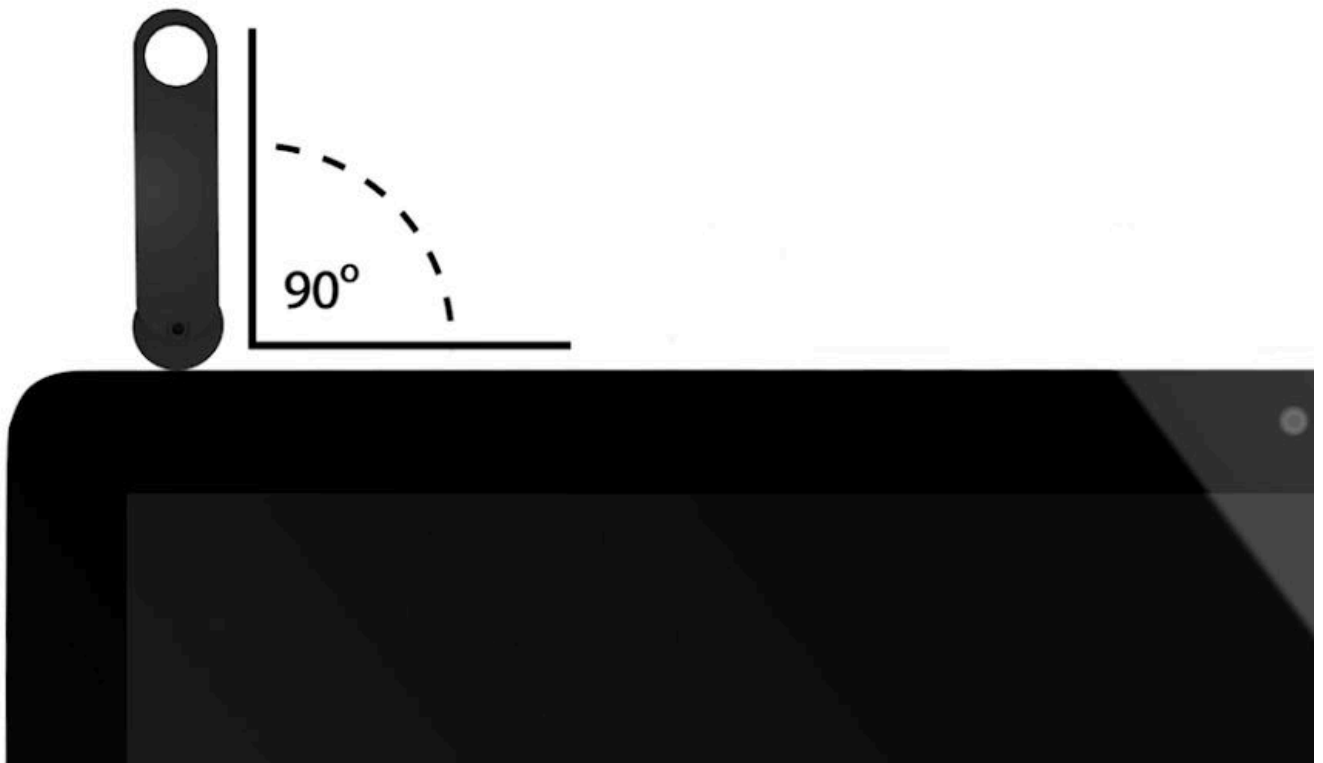
1. Use the service wedge to hold the display steady. When positioned correctly, the service wedge covers the power receptacle. Rotate the computer so the display panel is facing you.



2. Starting on the left side of the display, insert the display removal tool firmly between the display and the computer housing.



3. Hold the display removal tool perpendicular (at a 90-degree angle) to the edge.



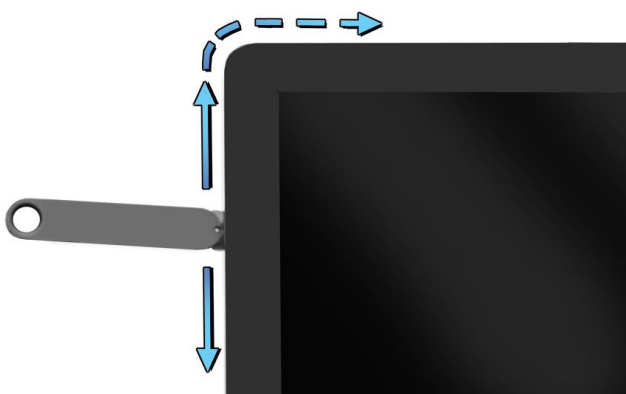
4. Roll the display removal tool back and forth in short increments along the top and sides of the display panel. Pay special attention to the top corners, as the tool must make steady contact with the display and housing.

**Note:** The camera is located at the top center on the rear housing. Carefully roll the tool across the entire top, but lift it slightly around the camera area.



5. Continue to roll the display removal tool until it moves with minimal resistance. Roll the tool back and forth multiple times along the top (except in the camera area) and sides of the display panel to cut through the VHB. Repeat the procedure until the tool moves with minimal resistance.

**Important:** If you just do one swipe with the display removal tool, it will not cut through the foam and it will be almost impossible to remove the display from the rear housing.





6. Use the flat end of a black stick to gently remove any remaining VHB.

**Caution:** Forcing the black stick between the display panel and the enclosure may cause the display panel to fracture.



7. Use a black stick and your fingers to separate the display panel from the rear housing. If there is resistance, then you need to remove more VHB.

**Caution:** To avoid damage to the display, do not pry off with the black stick.



8. Tilt the display open slightly, just enough for your hand to reach the cables connecting the display to the logic board. Be careful not to put stress on the display cables or connectors while tilting the display open. Remember that the bottom edge of the display is still attached with VHB.

**Do not** remove the display panel yet.





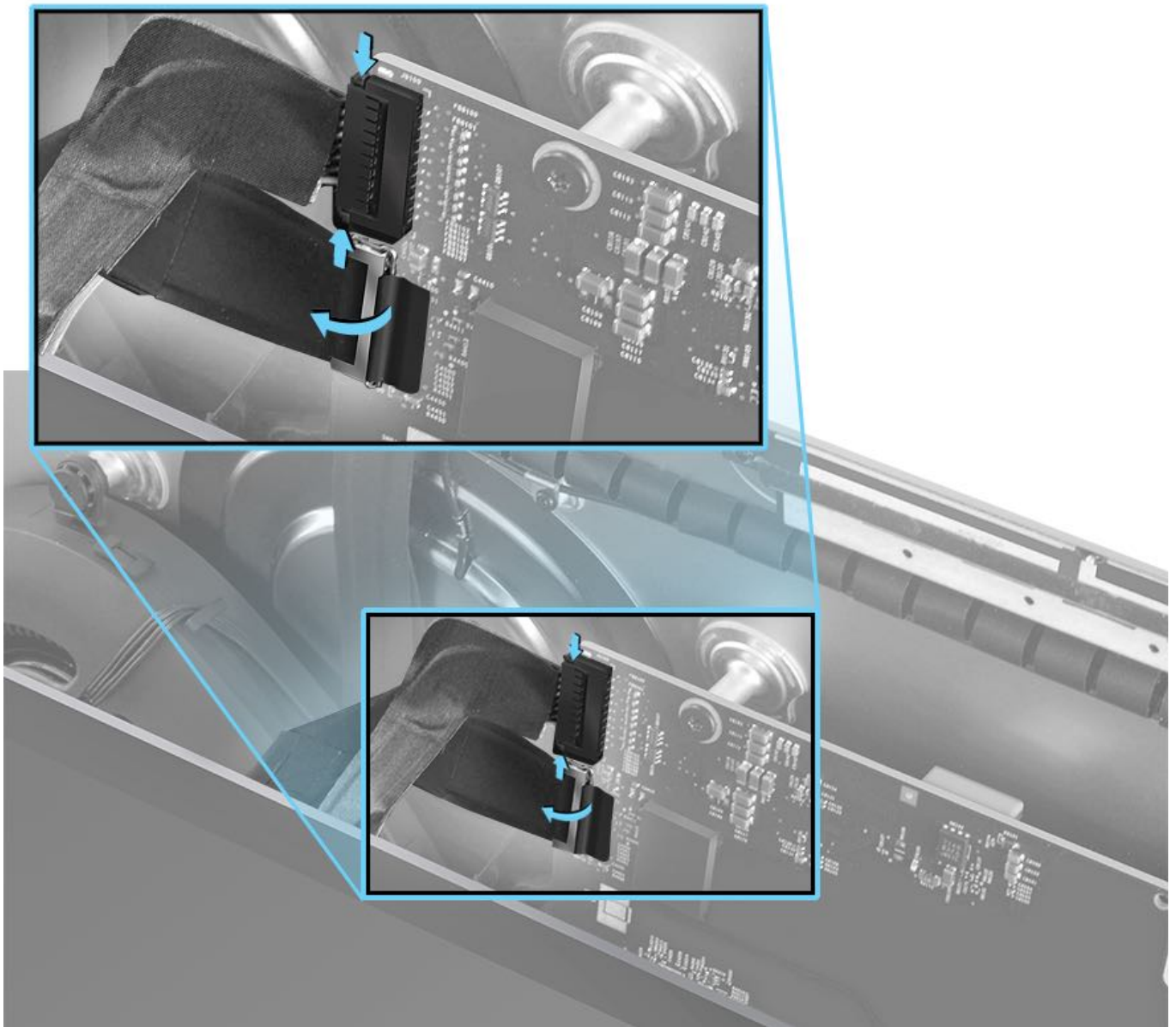
9. Disconnect the display backlight power cable (upper cable) from the logic board. Remove the Embedded DisplayPort (eDP) cable from the logic board.

**Important:** The procedure for disconnecting and removing these cables differs slightly between iMac models. Refer to the correct model and image below.

**iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)**

Disconnect the display backlight power cable (upper cable) from the logic board by pinching the sides and pulling the power cable straight out of its connector. Remove the Embedded DisplayPort (eDP) cable from the logic board by flipping the locking lever and gently pulling the cable straight out of its connector.

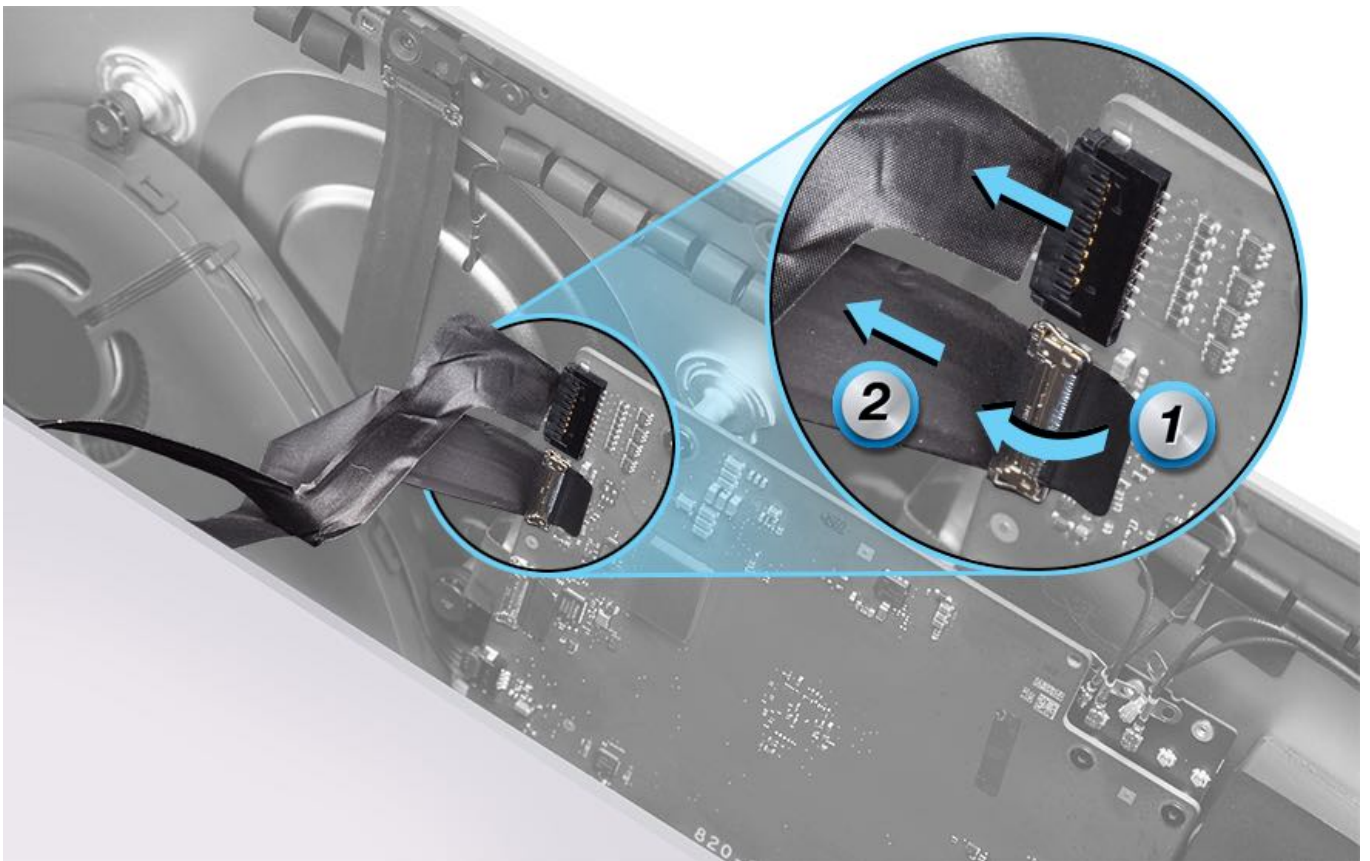
**Note:** The display backlight power cable is part of the display assembly and is not a separate part.



**iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017)**

Disconnect the display backlight power cable (upper cable) from the logic board by pulling the power cable straight out of its connector. Remove the Embedded DisplayPort (eDP) cable from the logic board by flipping the locking lever (1) and gently pulling the eDP cable (2) straight out of its connector.

**Note:** The display backlight power cable is part of the display assembly and is not a separate part.

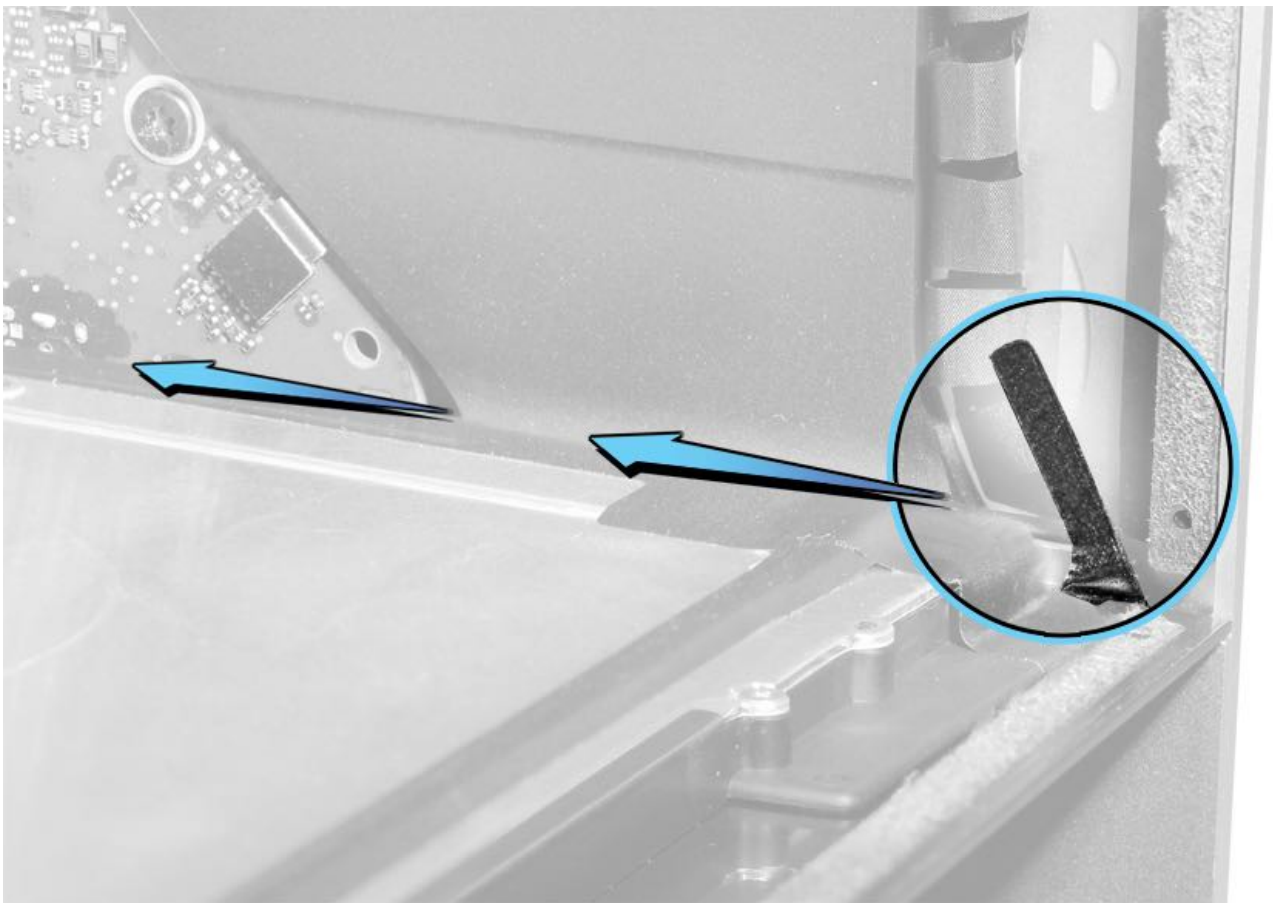


10. Tilt the display down.

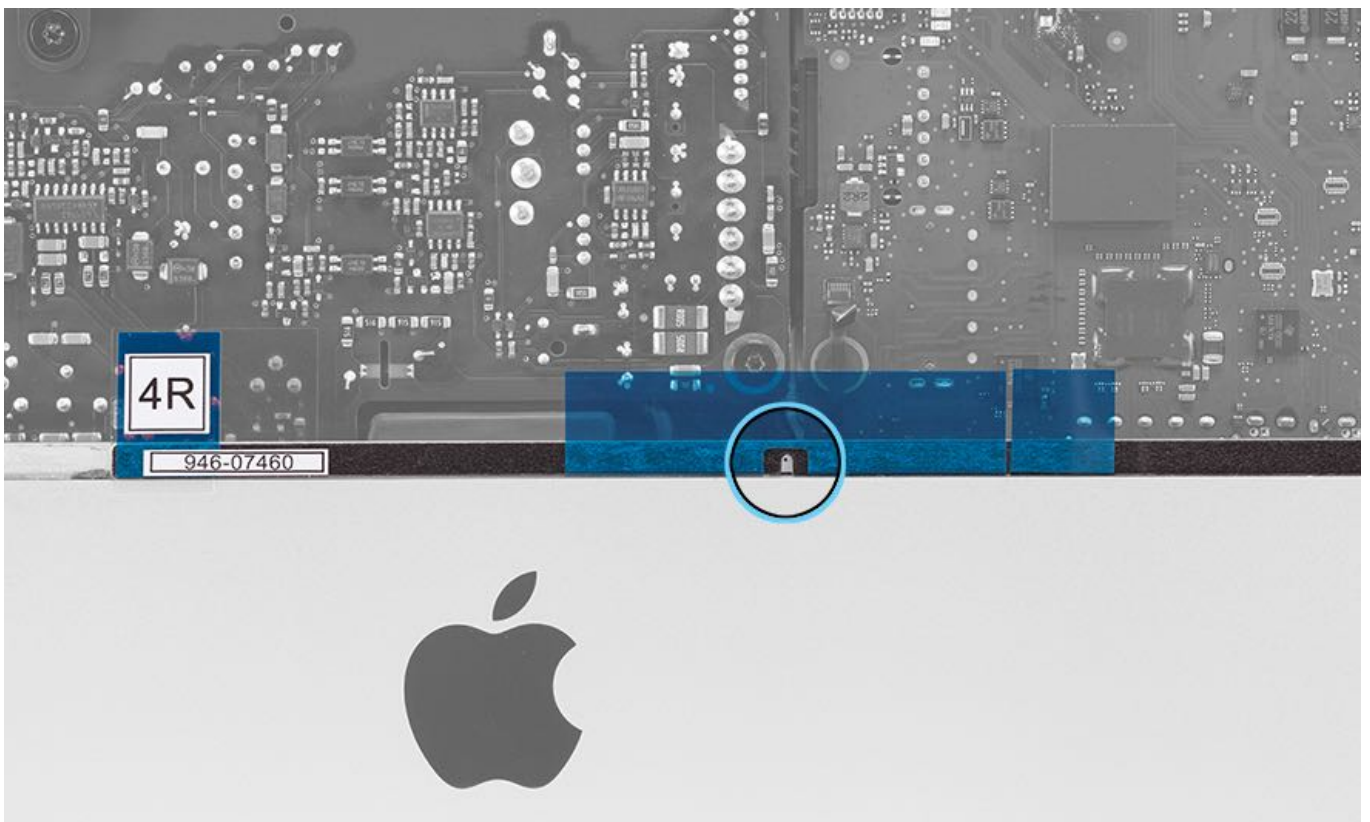


11. Locate the VHB pull tabs at the lower left and lower right corners of the display. While supporting the display, carefully pull the VHB tabs towards the center to break the VHB bond.





**Note:** On the 2017 model, the right VHB strip is likely to break at the perforation for the microphone hole, but it is necessary to peel the remaining VHB strip off the chin.



12. Gently lift the display panel off of the rear housing and store it in an ESD-safe bag.

### Steps For Reassembly

1. Remove the [display panel VHB strips](#).
2. Install new [display panel VHB strips](#).

3. Reinstall the [display panel](#).

# Display Panel - Removing Very High Bond (VHB) Strips

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV116: Display Panel Removal and Replacement Video](#).

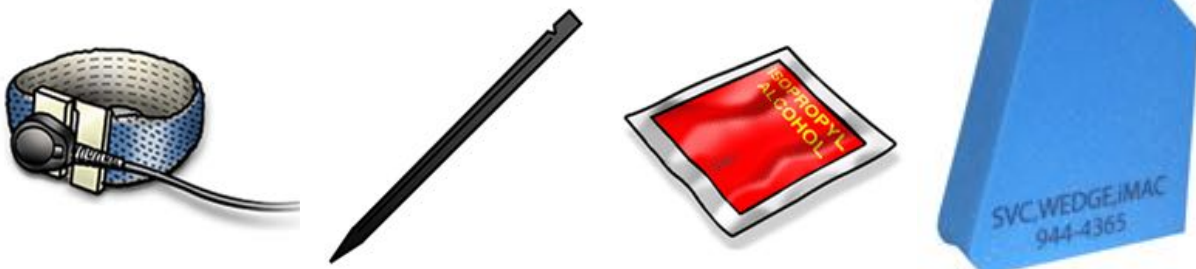
Remove:

- [Display panel](#)



## Tools

- ESD wrist strap and mat
- Black stick
- Isopropyl alcohol (IPA) wipes
- Service wedge (iMac)



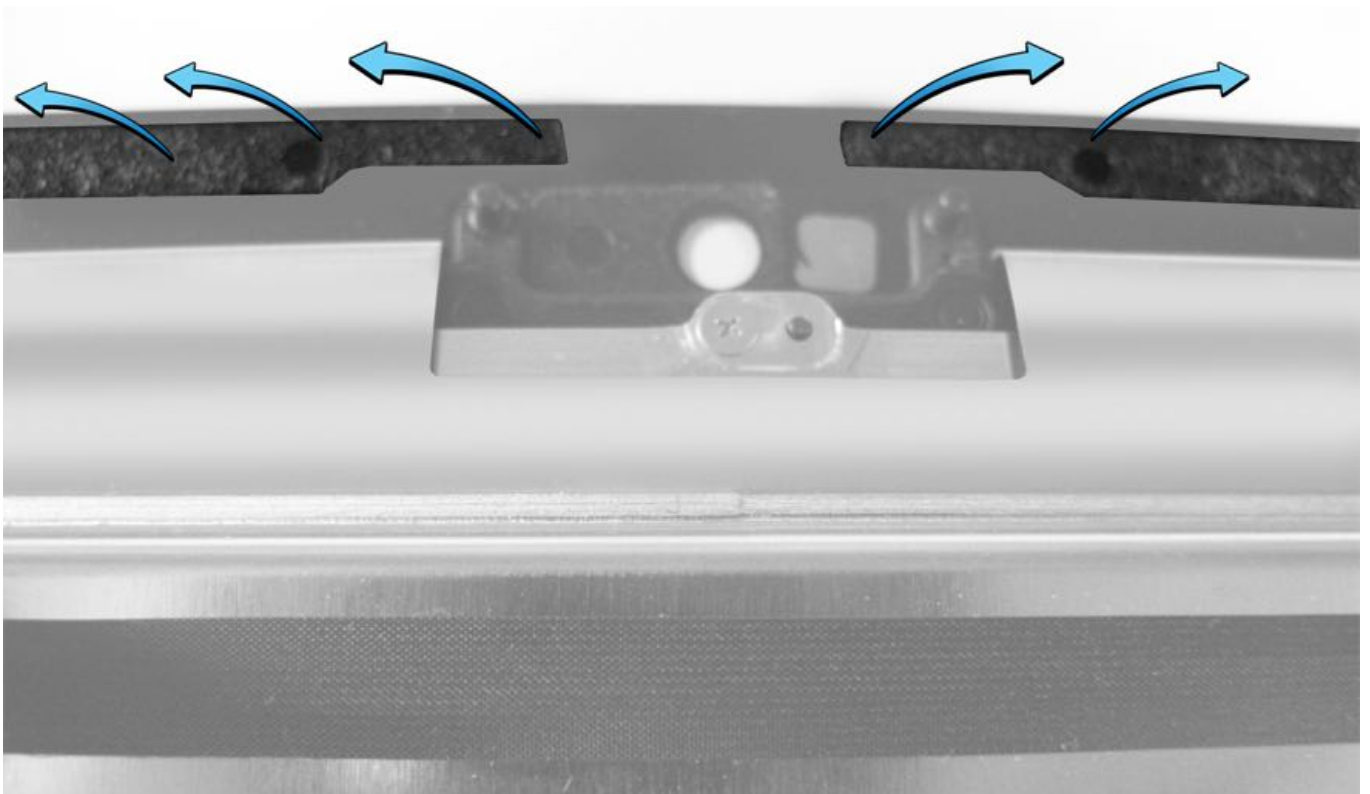
## Steps For Removal

1. Use your fingers and the flat end of a black stick to remove any residual very high bond (VHB) adhesive from the rear housing and display panel.



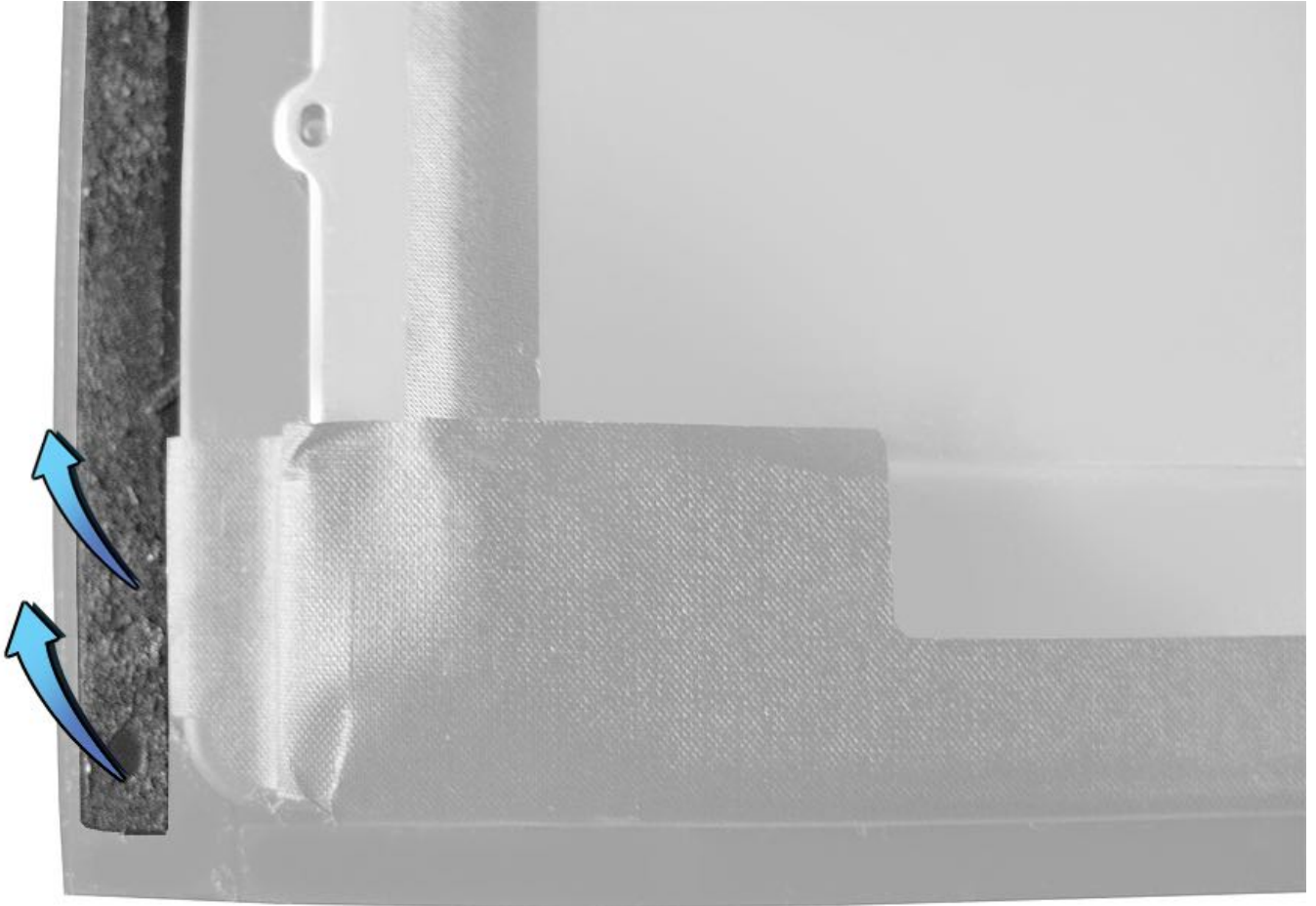
**Caution:** Be careful when removing VHB from the display panel. To prevent damage to the black Mylar protective film that is located on the display panel glass, ensure that you are peeling up the VHB and **not** the Mylar. An easy way to ensure that you do not peel up the Mylar on the display is to start peeling the VHB from the center points, not from the corners of the display.

The top of the display is shown. Peel VHB to the left and right, above the camera module location.





At the bottom corners of the display, peel the VHB upward.

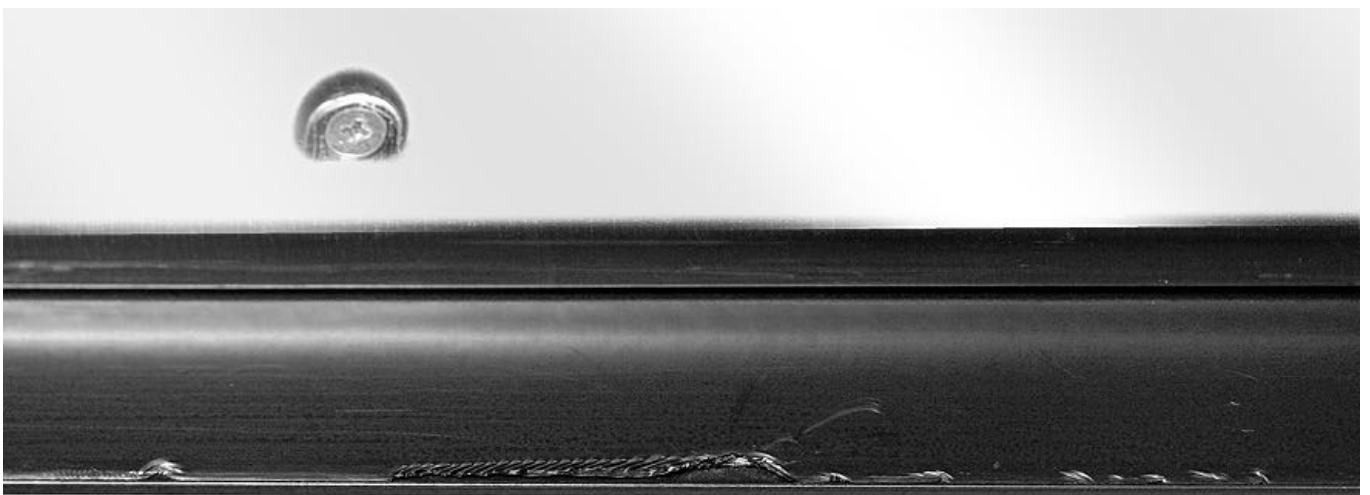


**Note:** If the black Mylar protective film is pinched or scratched like the one shown below, then simply press the Mylar back down with your finger or a black stick. The Mylar should be smooth and undamaged. Use caution when working around the black Mylar protective film. If the Mylar film is pulled from the display, then the display panel may need to be replaced.

Do not peel VHB from the display corners. The chance of damaging the Mylar film is greater if VHB removal is started in the corner.



Damaged Mylar film shown pulled away from the display panel.

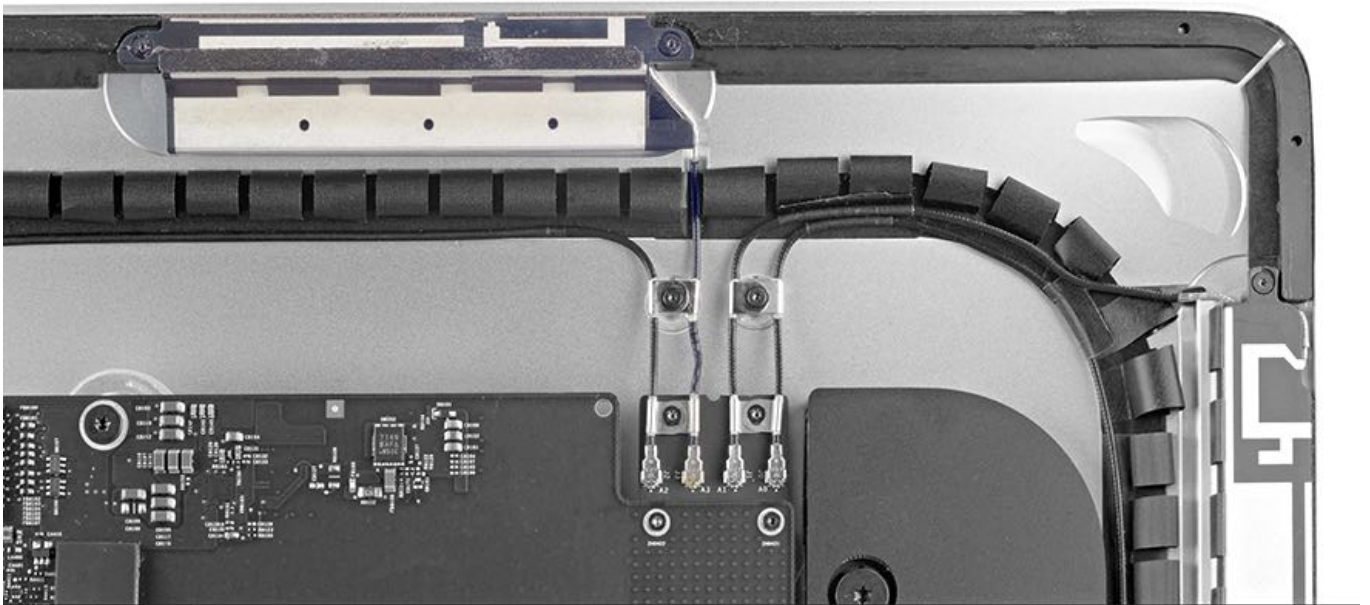


2. Clean residual VHB adhesive with an IPA wipe. Be sure to remove all traces of old VHB, or the new VHB strips will not adhere correctly. Allow surfaces to dry for one minute.

**Caution:** Use gentle pressure while cleaning the VHB adhesive residue, to avoid torquing the rear housing on its stand.



3. Check carefully that the rear housing, display panel, and Wi-Fi/Bluetooth antennas are free from VHB material and adhesive residue.



### Steps For Reassembly

1. Install new [display panel VHB strips](#).
2. Reinstall the [display panel](#).



# Display Panel - Replacing Very High Bond (VHB) Strips

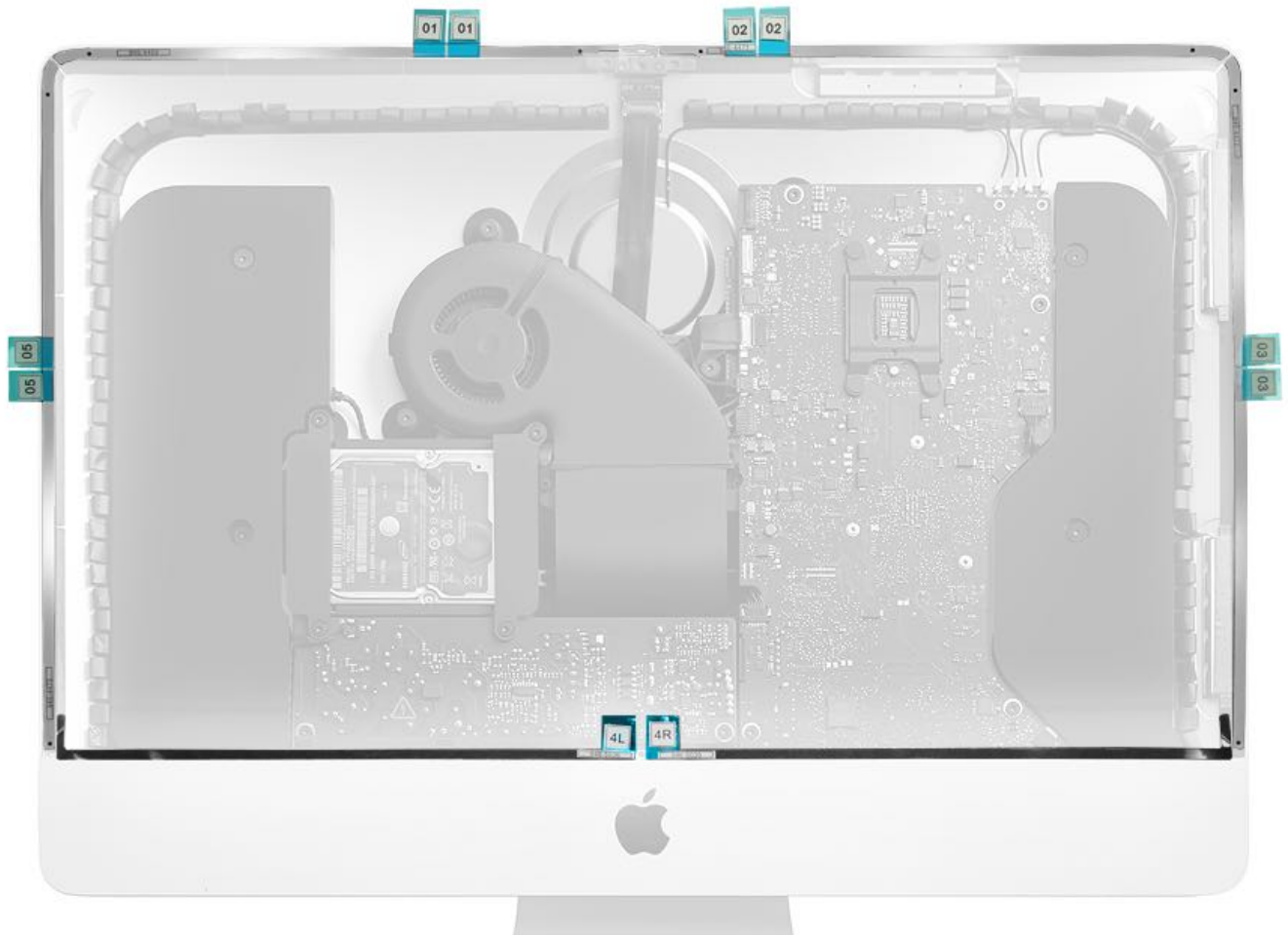
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV116: Display Panel Removal and Replacement Video](#).

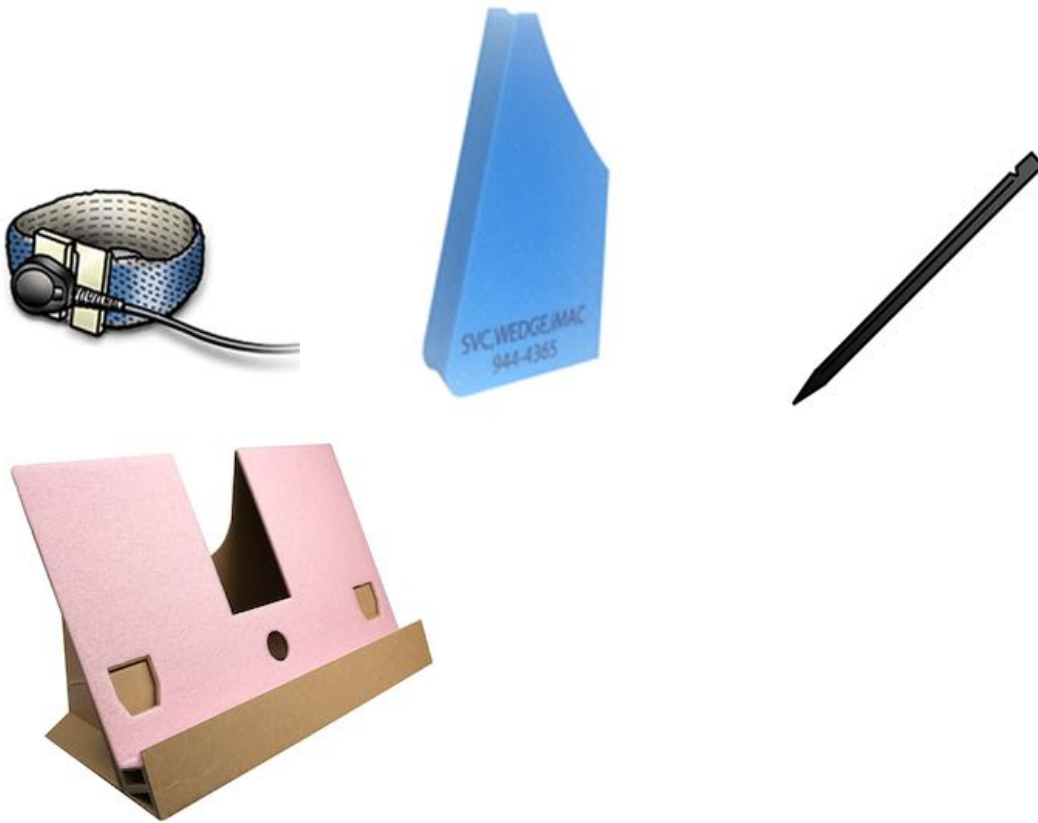
Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

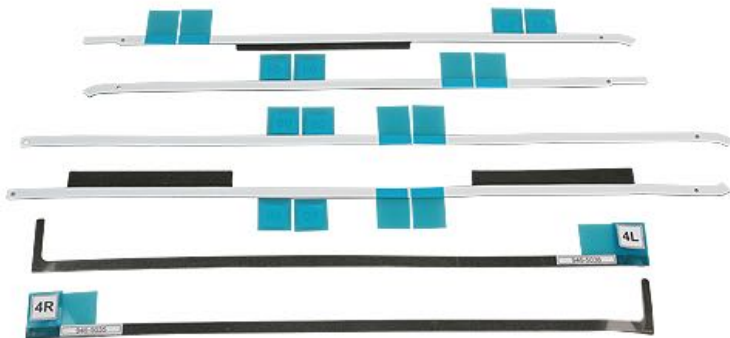


## Tools

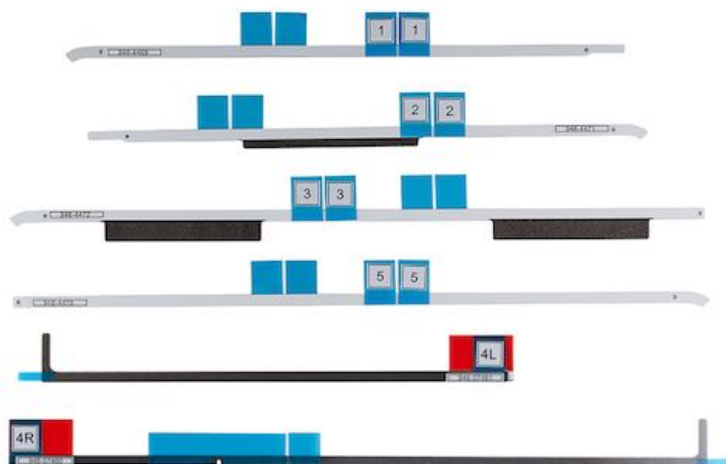
- ESD wrist strap and mat
- Service wedge (iMac)
- Black stick
- Stand, LCD Service Support (923-0416) (to support VESA mount adapter systems)
- Display Service Starter Kit, Very High Bond, VHB, 6-piece set, 20-pack (076-1444), for iMac 2015 models
- Display Service Starter Kit, Very High Bond, VHB, 6-piece set, 20-pack (076-00330), for iMac 2017 models
- Display Refill Kit, Very High Bond, VHB, 6-piece set, 20-pack (076-1437), for iMac 2015 models
- Display Refill Kit, Very High Bond, VHB, 6-piece set, 20-pack (076-00331), for iMac 2017 models



**iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015) VHB strips**



**iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017) VHB strips**



## Steps For Removal

This is a reassembly instruction article. For removal steps, see article [RP1257: Display Panel - Removing Very High Bond \(VHB\) Strips](#).

## Steps For Reassembly

1. Insert the iMac service wedge. The AC receptacle is covered when the service wedge is installed correctly.



2. Each VHB strip has an ID number on the pull tab (1–5) and a part number (946-xxxxx) printed on the strip. Use the tables and pictures below to verify that you have all the needed VHB strips. Lay out the VHB strips before installing them onto the computer and check them for damage. Check that there are no wrinkles or exposed sections on the strip. Damage can cause cosmetic gap issues, make the display bond weak, or create light leakage.

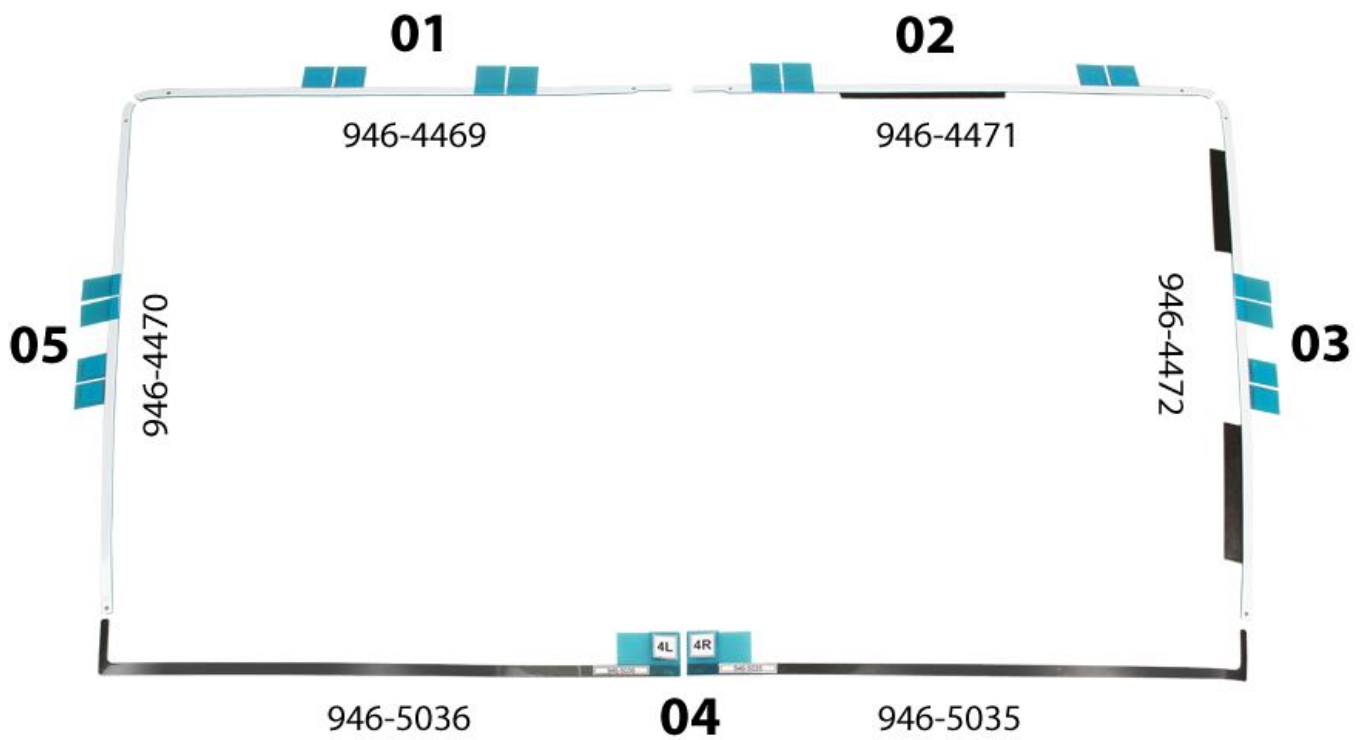
**Note:** The bottom left and right VHB strips on the iMac (2017) models are different from the bottom strips on the iMac (Late 2015) models. The bottom right strip labeled 4R for iMac (2017) models has a perforation in the VHB for the microphone hole. Make sure to use the correct strip and to line up the perforation with the microphone hole or it could lead to microphone issues.

### VHB for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

VHB Strip Description	VHB Strip ID Number	Part Number on VHB Strip
Top left	01	946-4469
Top right	02	946-4471
Right side	03	946-4472
Left side	05	946-4470
Bottom left	4L	946-5036
Bottom right	4R	946-5035

### VHB layout for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

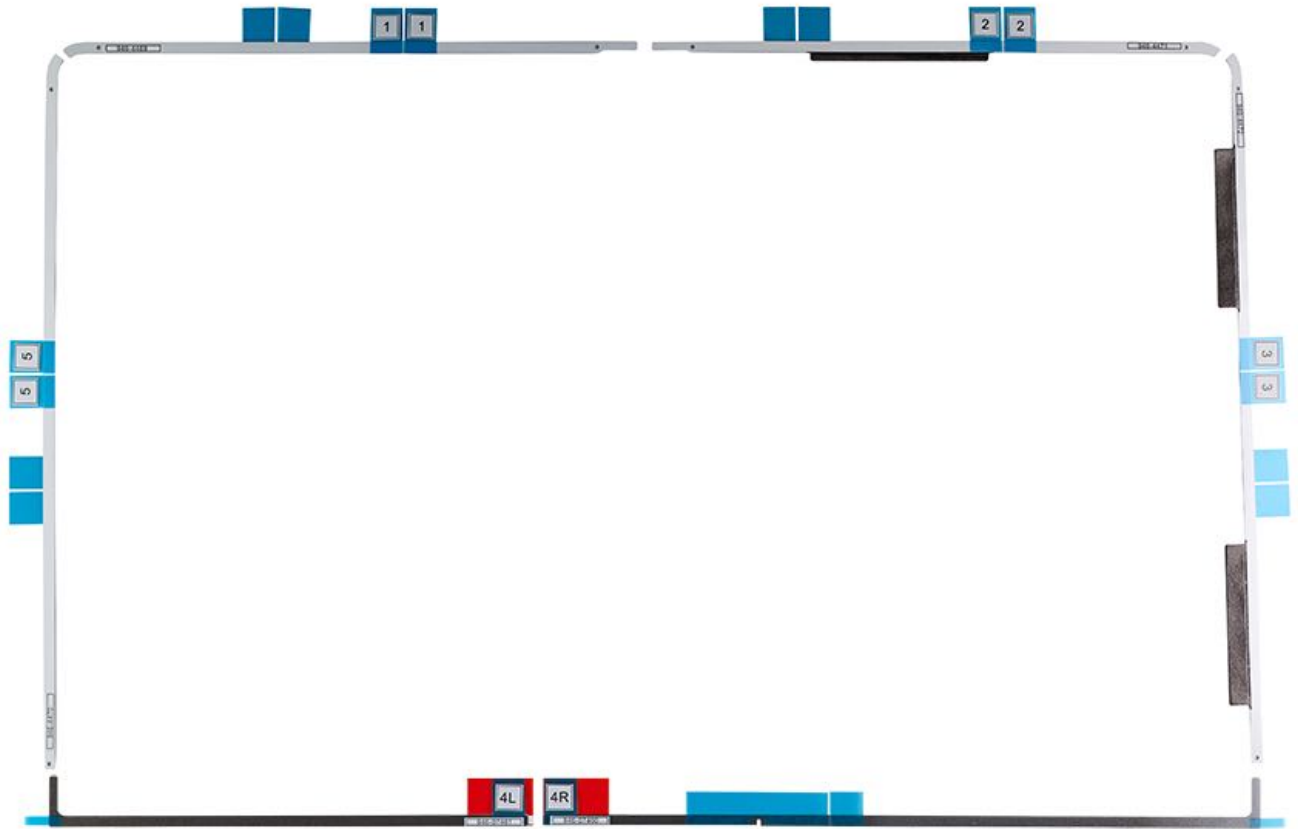




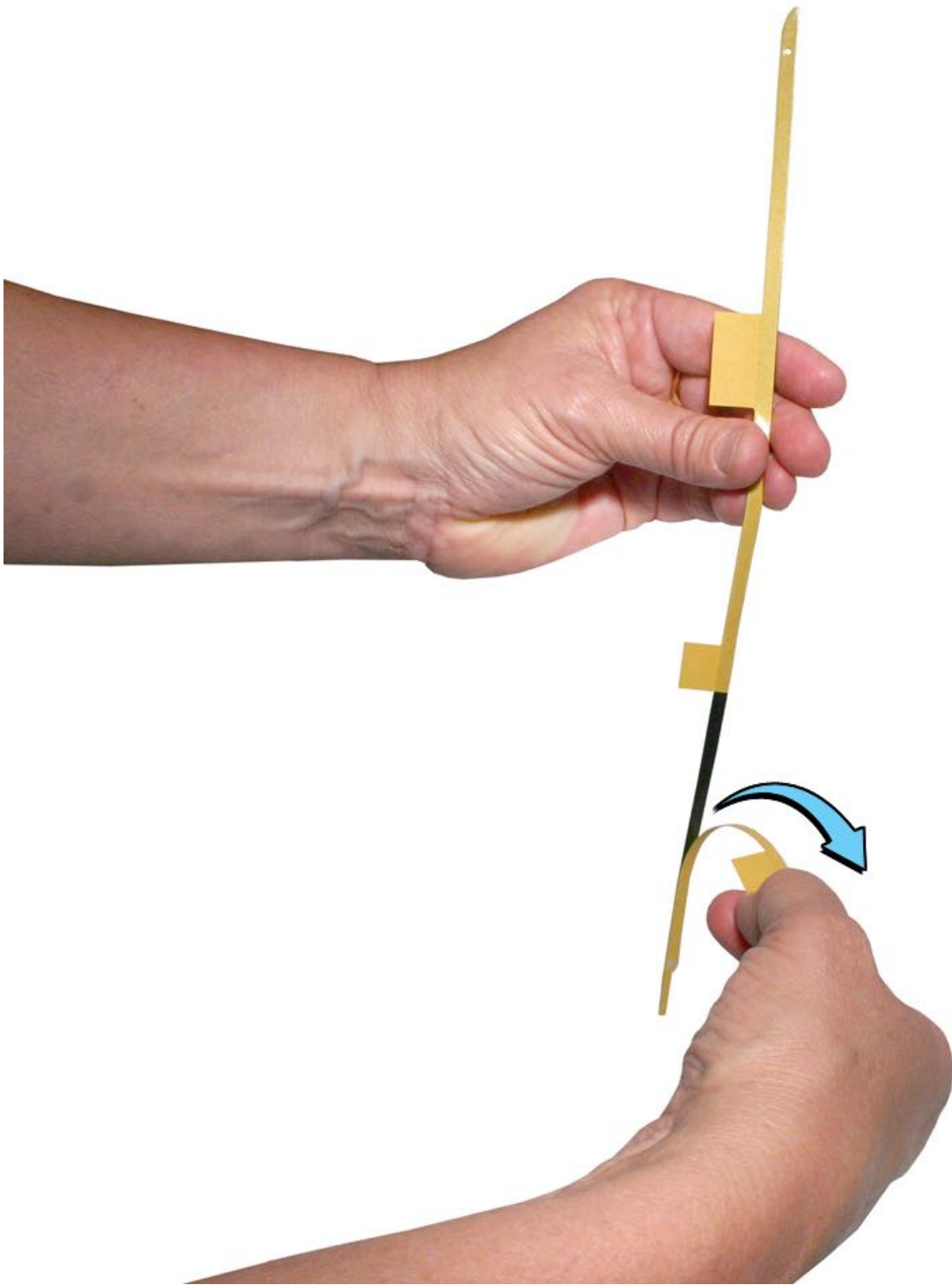
**VHB for iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017)**

VHB Strip Description	VHB Strip ID Number	Part Number on VHB Strip
Top left	1	946-4469
Top right	2	946-4471
Right side	3	946-4472
Left side	5	946-4470
Bottom left	4L	946-07461
Bottom right	4R	946-07460

**VHB layout for iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017)**



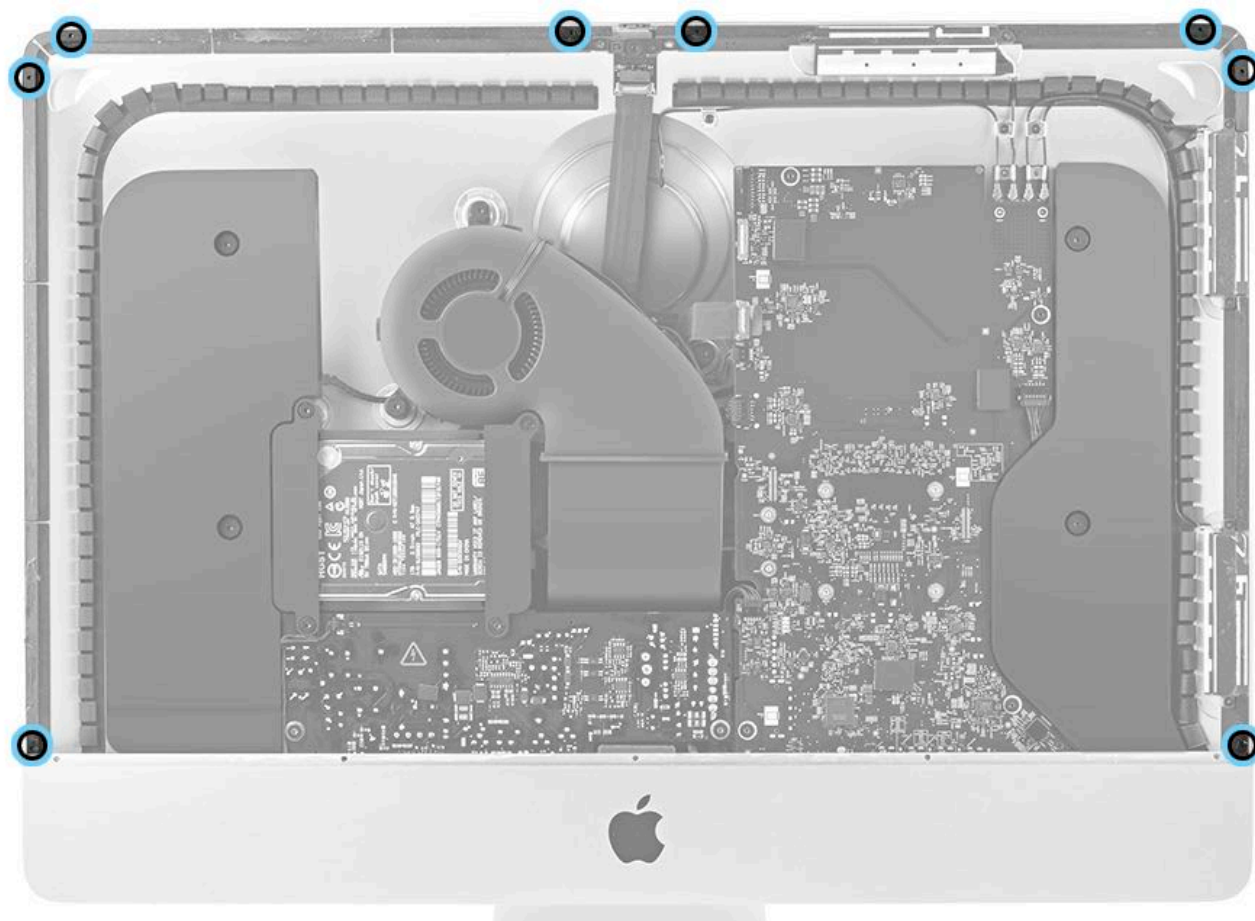
3. The VHB strips have a foam layer (VHB/foam/VHB), with a removable liner on the underside and a clear plastic liner on the top side. **Note:** The color of the removable liner may vary between VHB vendors.



4. Before adhering the VHB strips and installing the display, verify that all cables are connected, all screws are installed, and that there is no debris present in the computer.



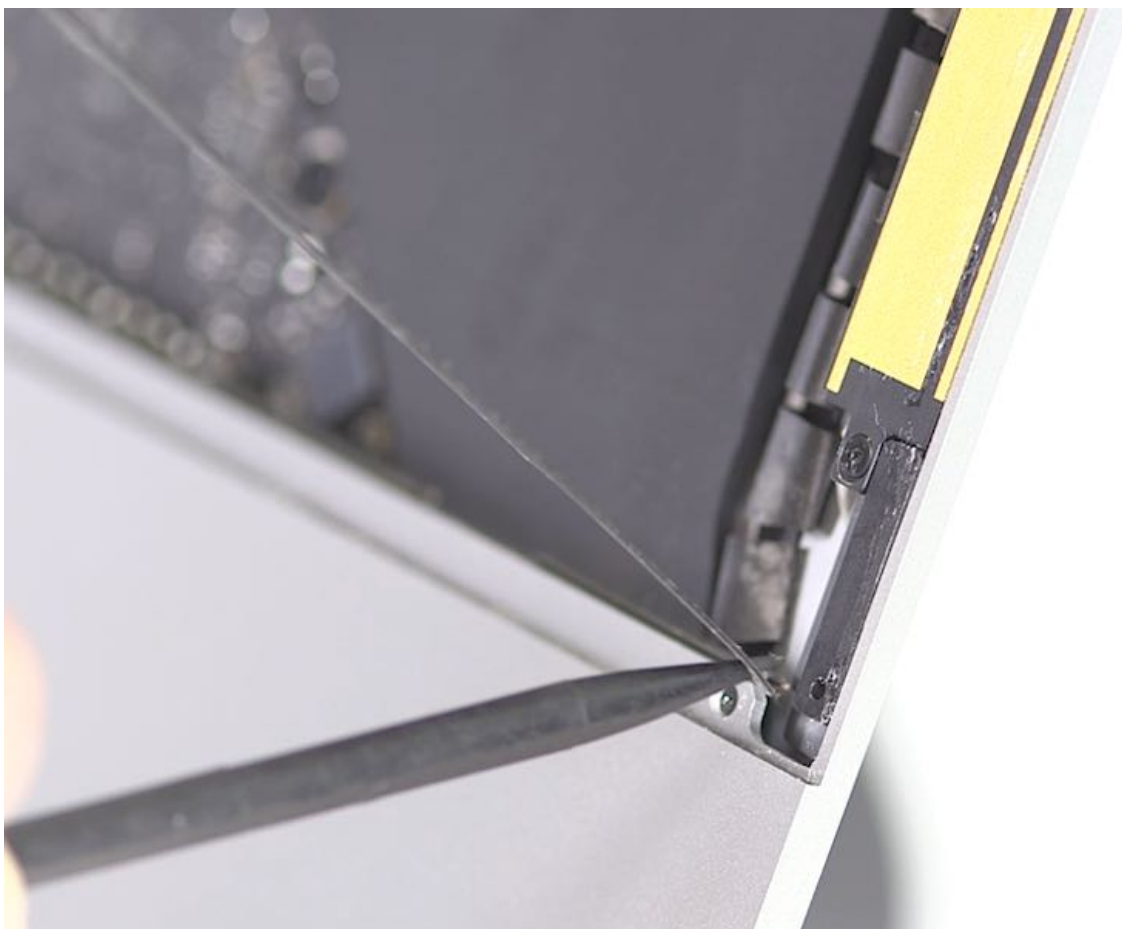
5. The rear housing has eight VHB alignment holes. Use them to align the new VHB strips.



6. Peel the paper backing off of one portion of a VHB strip.



7. Push the pointed end of a black stick through the alignment hole in the VHB strip, then point the black stick into the corresponding alignment hole in the rear housing. Keep the VHB strip pulled taut throughout the installation process.

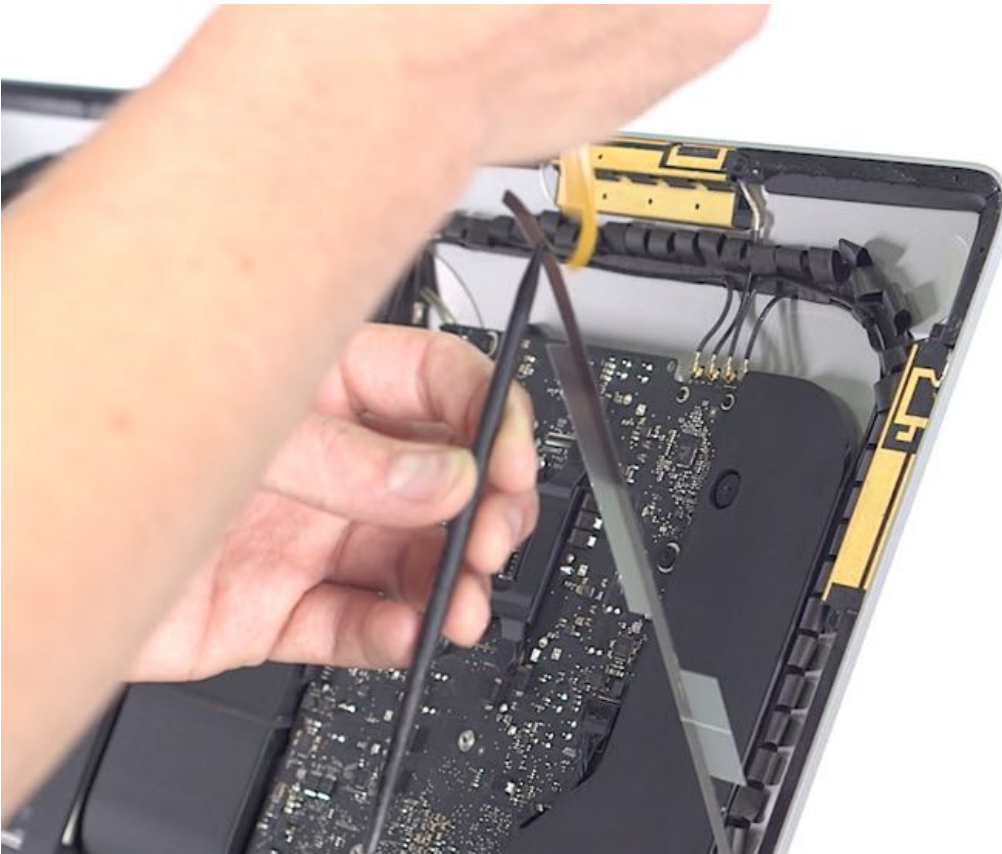


8. Push gently upward with your finger to adhere the bottom of the VHB strip in place.



9. Insert the pointed end of the black stick into the other alignment hole and peel the paper backing off.





10. With the black stick in the alignment hole, position the VHB strip on the edge of the rear housing. Use your finger to gently smooth the strips. Check that there are no wrinkles, overlaps, or bumps on the strip. Improper installation may result in cosmetic issues.



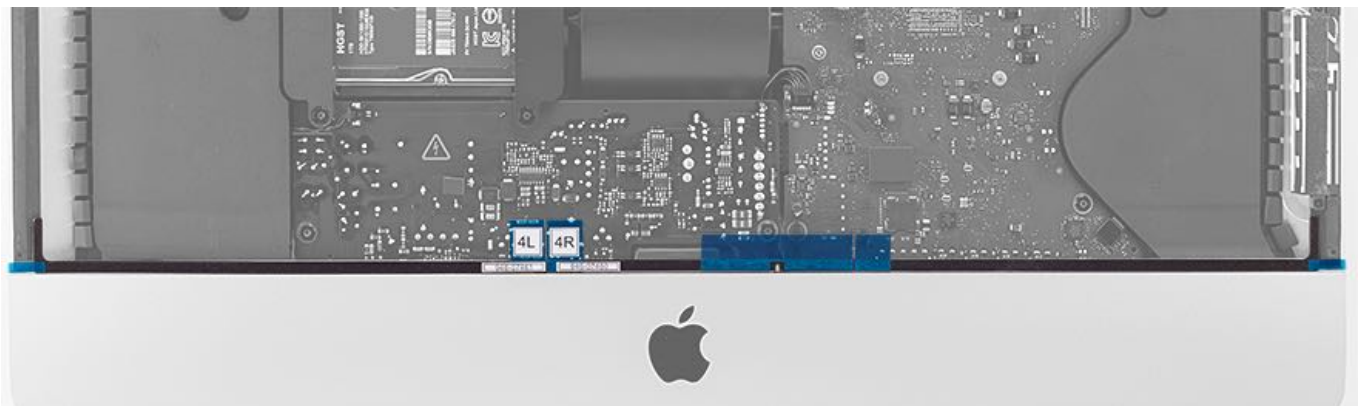
11. Two strips of VHB are used along the bottom edge and are labeled 4L and 4R. There are no guide holes on the VHB strip or rear housing for the bottom strips. Align the strip carefully by hand. The angled ends of the VHB strip should attach to the rear housing and should not overlap the VHB strips on the sides.

**Important:** The bottom left and right VHB strips on the iMac (2017) models are different from the bottom strips on the iMac (Late 2015) models. The bottom right strip labeled 4R for iMac (2017) models has a perforation in the VHB for the microphone hole, refer to image below. Make sure to use the correct strip and to line up the perforation with the microphone hole or it could lead to microphone issues.

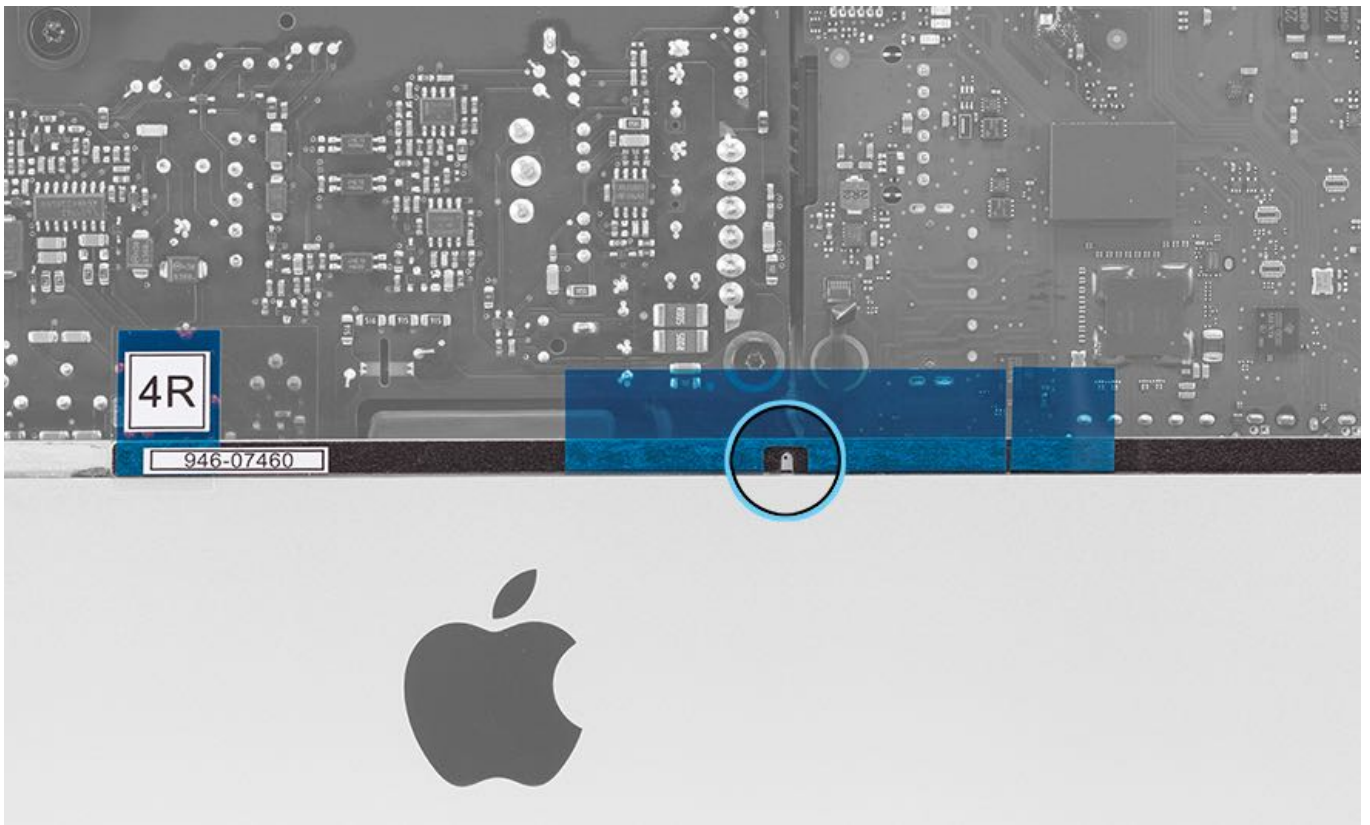
#### **iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015) Bottom VHB Strips**



#### **iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017) Bottom VHB Strips**



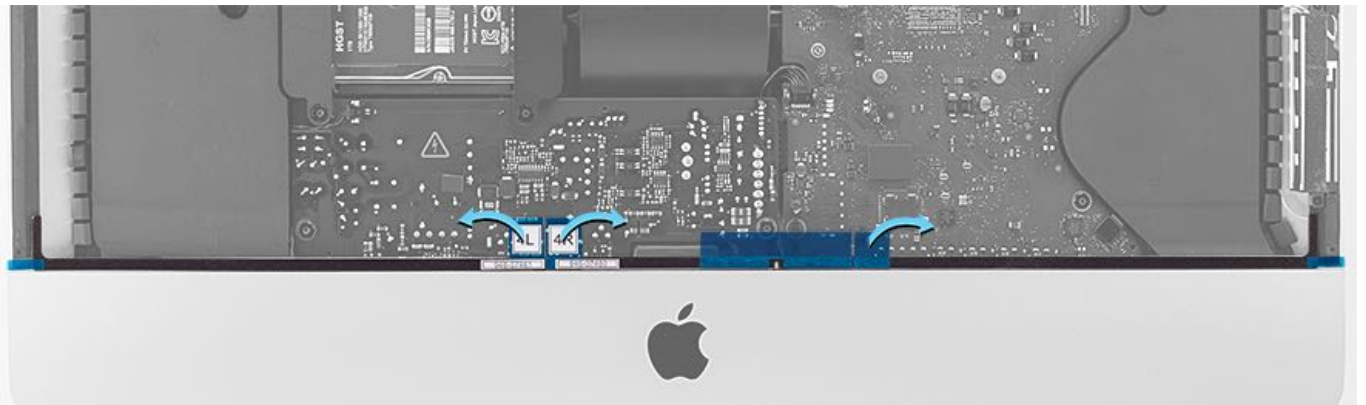
#### **iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017) VHB Perforation for Microphone**



**Caution:** If any VHB strip does not line up correctly, then remove it, clean the rear housing, and start again. Check that there are no wrinkles or exposed sections on the strip. Damage can cause cosmetic gap issues and may make the display bond weaker or create light leakage.

12. Remove the blue tabs to expose the VHB.

**iMac (21.5-inch, 2017) and iMac (Retina 4K, 21.5-inch, 2017) Model**



13. To install the display panel, refer to [RP1232: Display Panel Replacement](#).

# Display Panel Replacement

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV116: Display Panel Removal and Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

Replace:

- [Display panel VHB strips](#)



## Tools

- Display removal tool
- Service wedge (iMac)
- Isopropyl alcohol (IPA) wipes
- Safety glasses
- Painter's tape (tape that does not leave a residue, 1 to 2 inches wide, preferably 2-inch if available)
- Silicone display roller
- Clean, damp, lint-free cloth





## Steps For Removal

This is a reassembly instruction article. Before you begin, refer to the following articles:

- [RP1230: Display Panel Removal](#)
- [RP1257: Display Panel - Removing Very High Bond \(VHB\) Strips](#)
- [RP1231: Display Panel - Replacing Very High Bond \(VHB\) Strips](#)

If you have already performed the removal and replacement tasks listed above, then proceed to the next step.

## Steps For Reassembly

1. Position the service wedge between the stand and the back of the rear housing. The AC receptacle is covered when the service wedge is installed correctly.



2. Before installing the display panel, use IPA wipes to ensure that all VHB adhesive residue is cleaned off of the display panel and the rear housing.

**Important:** If the display panel cracks or breaks, refer to article [TP819: Cleaning and Handling a Broken Display Panel](#).



3. Place the bottom edge of the display panel on the chin of the rear housing.



4. Position the display panel and verify that it is centered and seated. Use the display removal tool to check alignment on both sides of the display. Adjust if necessary. As you look straight on (as a user would) at the display, you should not see any silver from the rear housing showing at the sides of the display.





5. Stand back to check the alignment of the display. If the rear housing can be seen, then adjust and check again.

**Incorrect**



**Correct**



6. Anchor the display panel with a strip of painter's tape. Place the tape over the bottom of the display and the edge of the rear housing.



7. Step back and check for alignment again. The picture below shows incorrect alignment with the silver rear housing showing on the right side of the display. If the rear housing can be seen, then adjust the alignment and check again.



8. Place two vertical pieces of painter's tape along the bottom piece for added support.



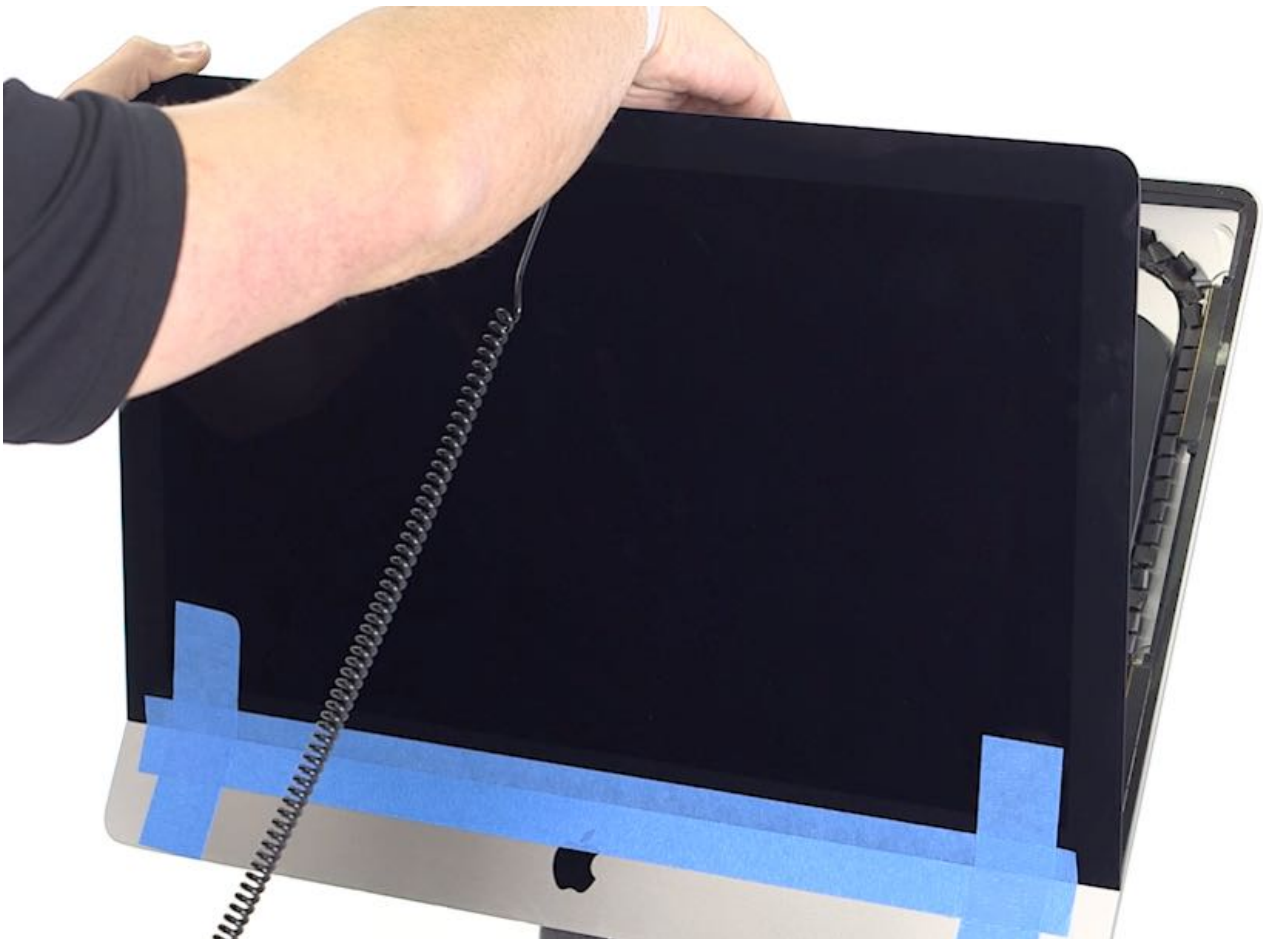
9. Use one hand to tilt the display toward you.



10. Support the center edge of the display with one hand while using the other hand to pull the top release liners on the VHB strips at the chin. Pull slowly so they do not tear or break. To avoid contaminating the VHB strips while connecting the display cables, only remove the chin release liners for now.



11. Tilt the display, leaving enough room to connect the power and Embedded DisplayPort (eDP) cables to the logic board. If these cables are not connected properly, then it could result in no video or no power.

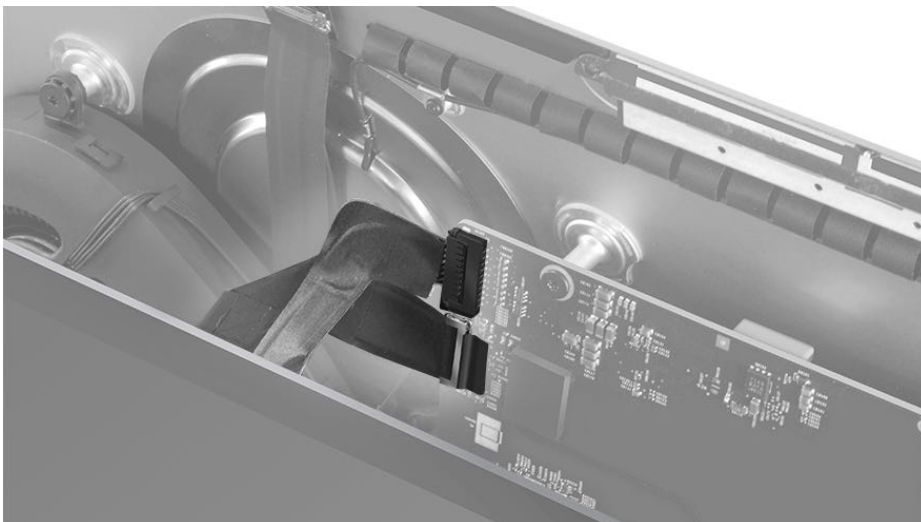


12. Connect two cables:

- **Display power cable:** Push the cable straight into its connector.
- **eDP cable:** Verify that the locking lever is positioned as shown. Push the cable straight into its connector, move the locking lever forward, and gently press on both sides of the lever simultaneously to securely fasten the lever.



Check that the connectors are firmly seated.





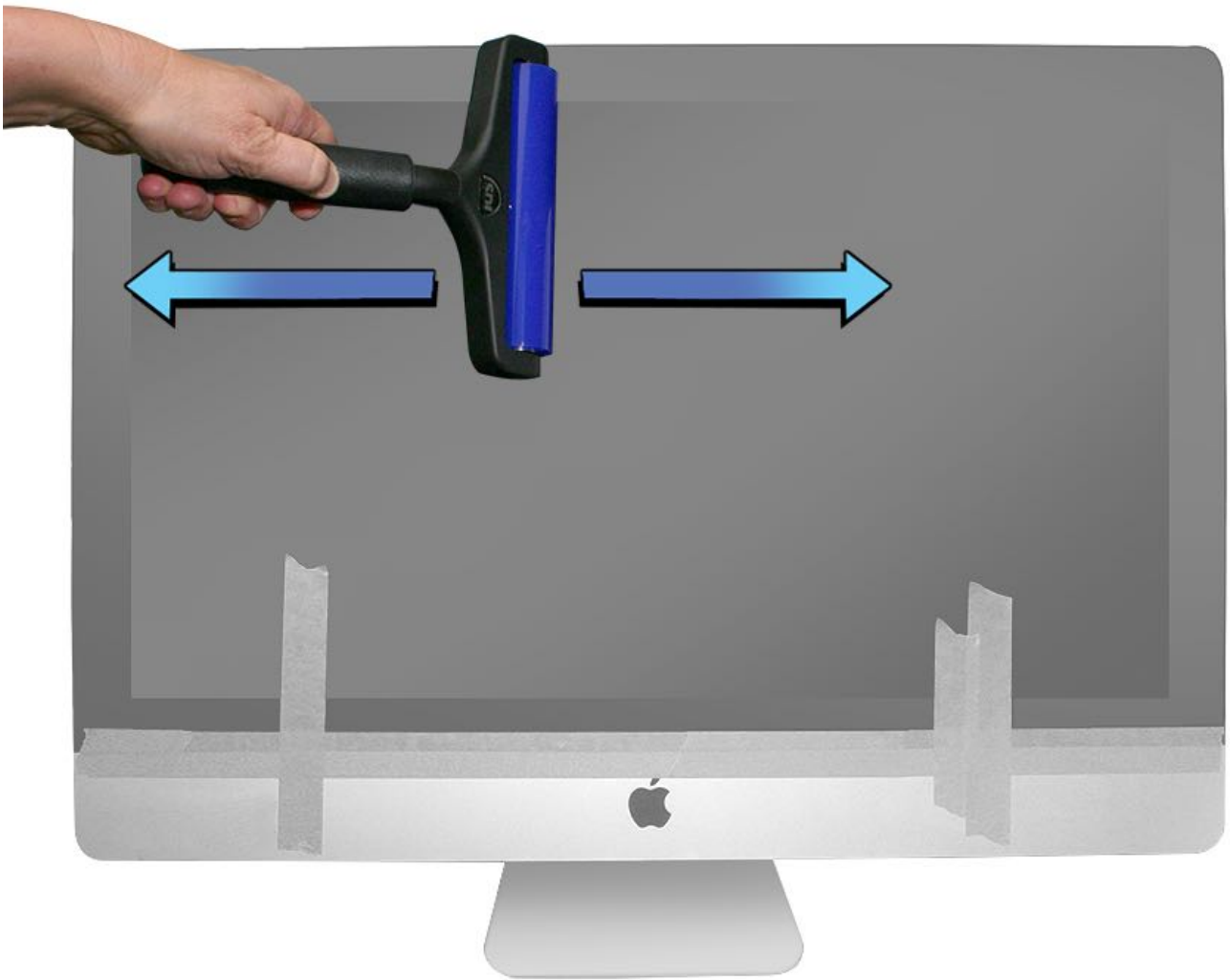
13. Remove any remaining VHB release liners and press the display panel back firmly.



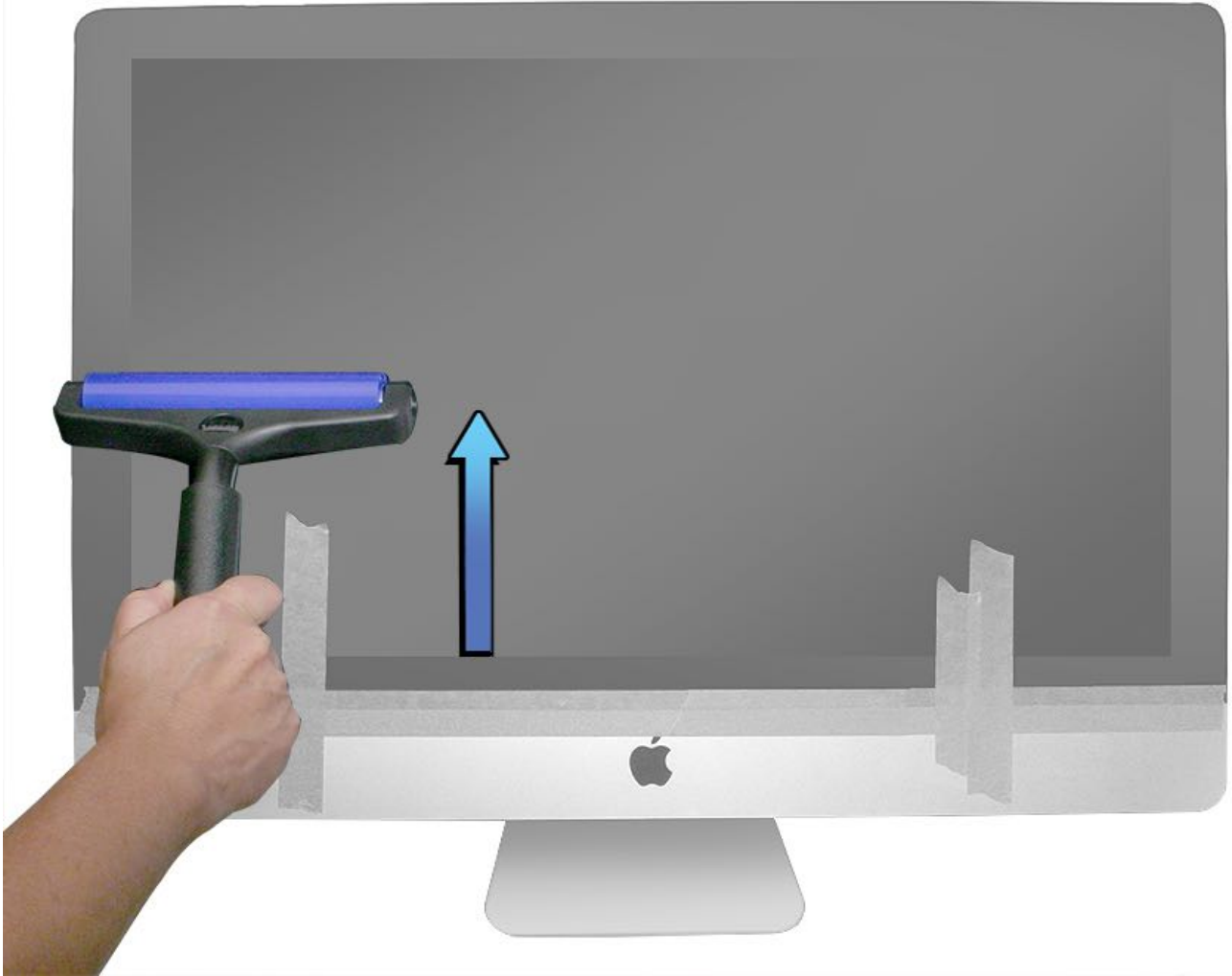
14. Use the silicone roller to adhere the VHB. Use your other hand to keep the computer steady.

**Caution:** Do not pinch or press the perimeter of the glass with your fingers. This may cause the glass to chip or crack.





15. Along the right and left sides, start at the bottom edge and roll in an upward direction only. Do not roll up and down or the glass may streak.



16. Remove the tape.



17. Clean the front of display with a clean, damp, lint-free cloth.

**Note:** IPA wipes should only be used to remove residual VHB adhesive.



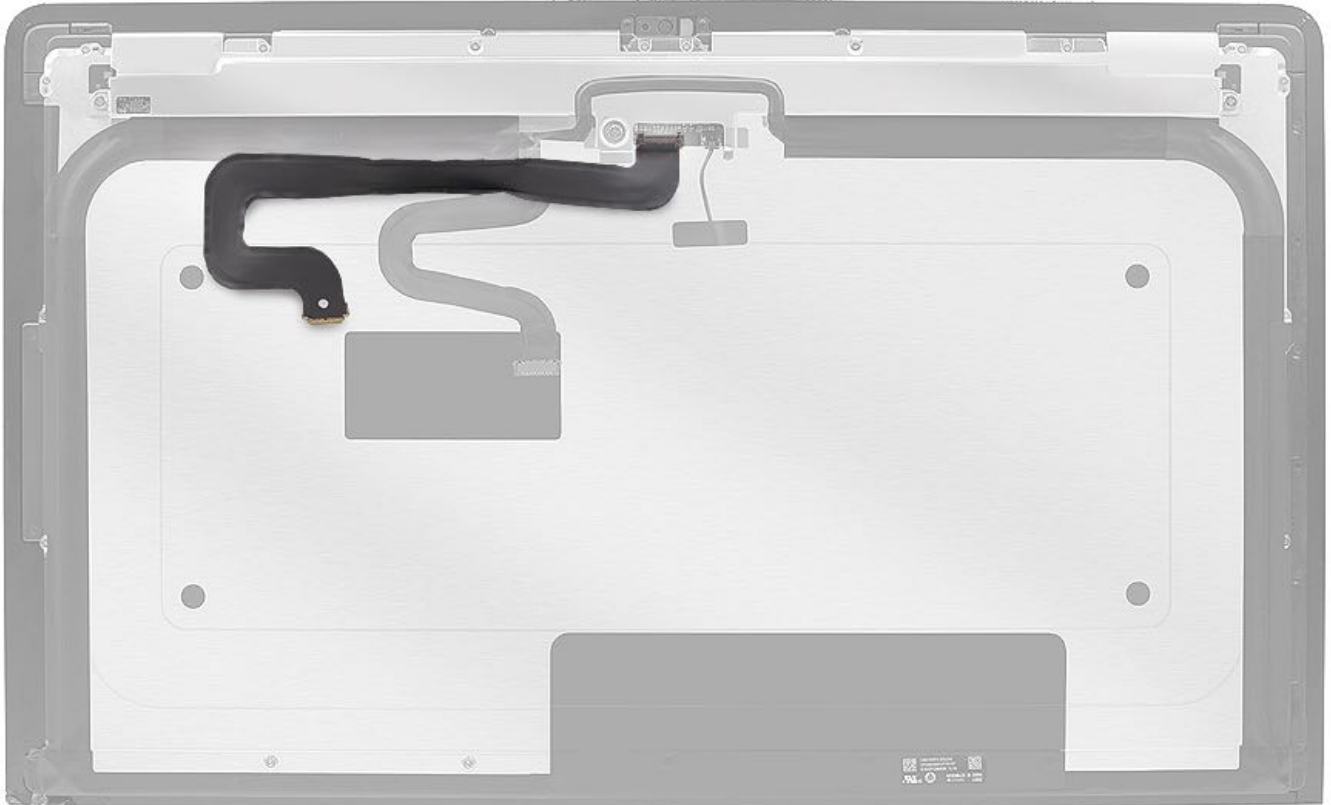
# Embedded DisplayPort (eDP) Cable

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

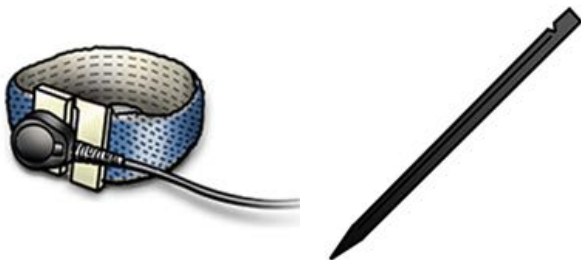
Remove:

- [Display panel](#)
- [Display panel VHB strips](#)



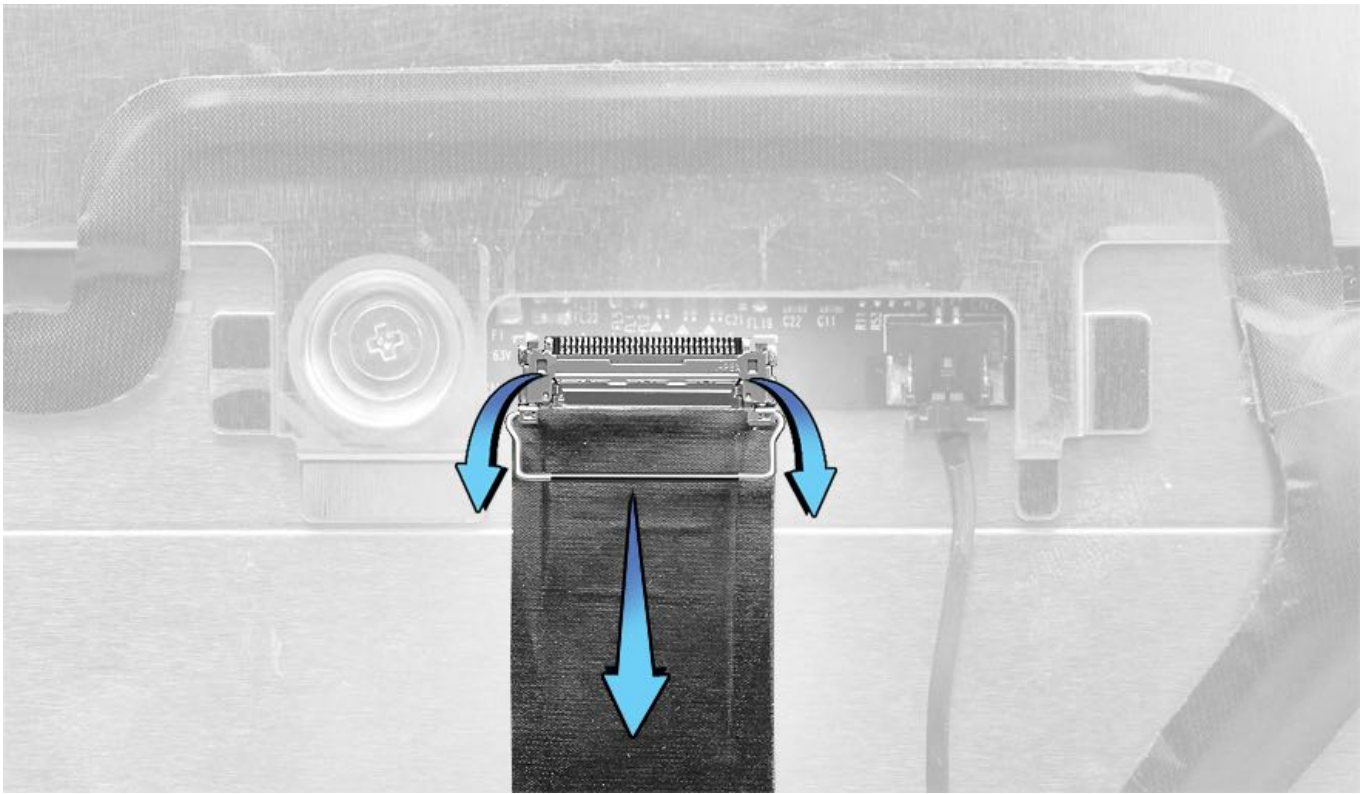
## Tools

- ESD wrist strap and mat
- Black stick



## Steps For Removal

1. Remove any tape securing the Embedded DisplayPort (eDP) cable to the display panel.
2. Use a black stick to “unlock” the lock bar by gently flipping the bar toward the eDP cable.
3. Gently pull the eDP cable out of the connector.



### Steps For Reassembly

1. Insert the eDP cable into its connector. Flip the lock bar up, ensuring that the cable is securely connected. Replace any tape covering the cable.

**Important:** Press down around the lock bar to lock the lever into place.

2. Install new [display panel VHB strips](#).

3. Reinstall the [display panel](#).

# Display Thermal Sensor Cable

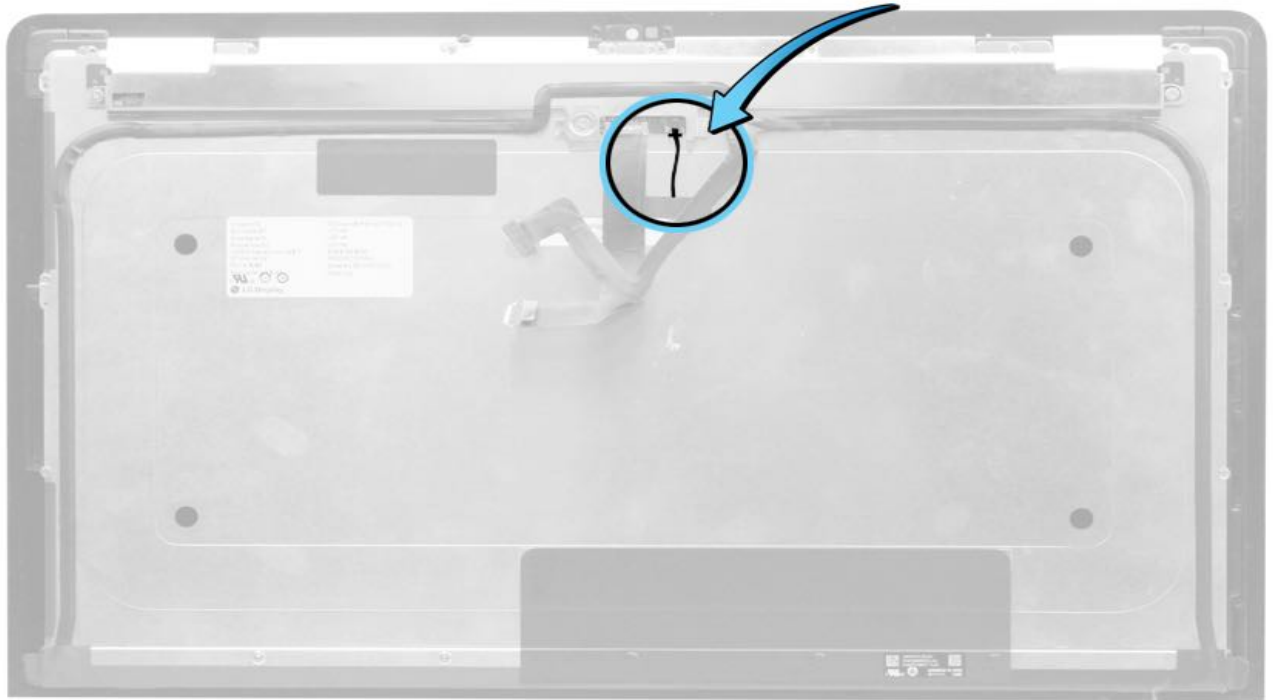
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

iMac (21.5-inch, Late 2015 and 2017)



iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)





## Tools

- ESD wrist strap and mat
- Black stick

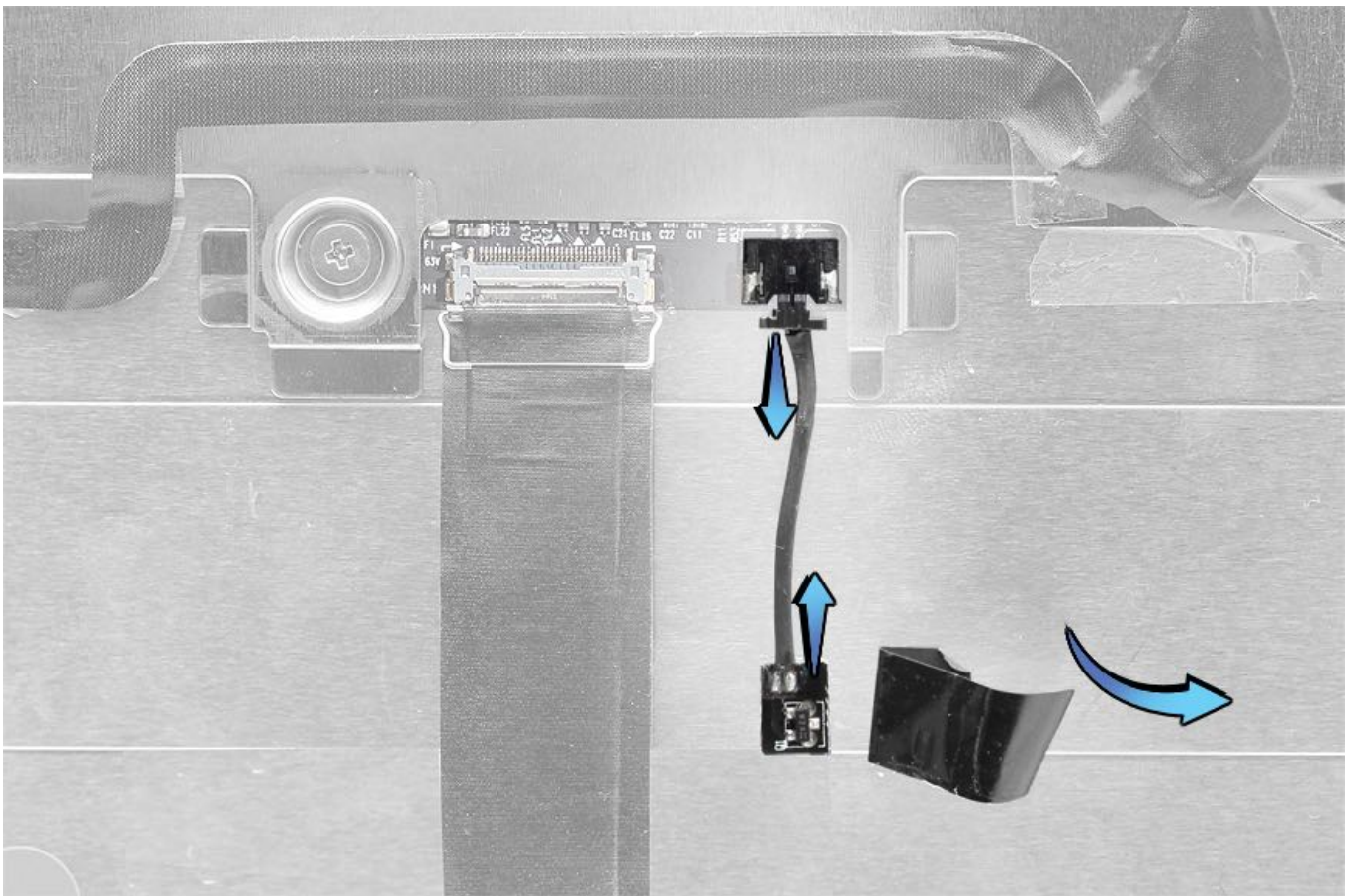


## Steps For Removal

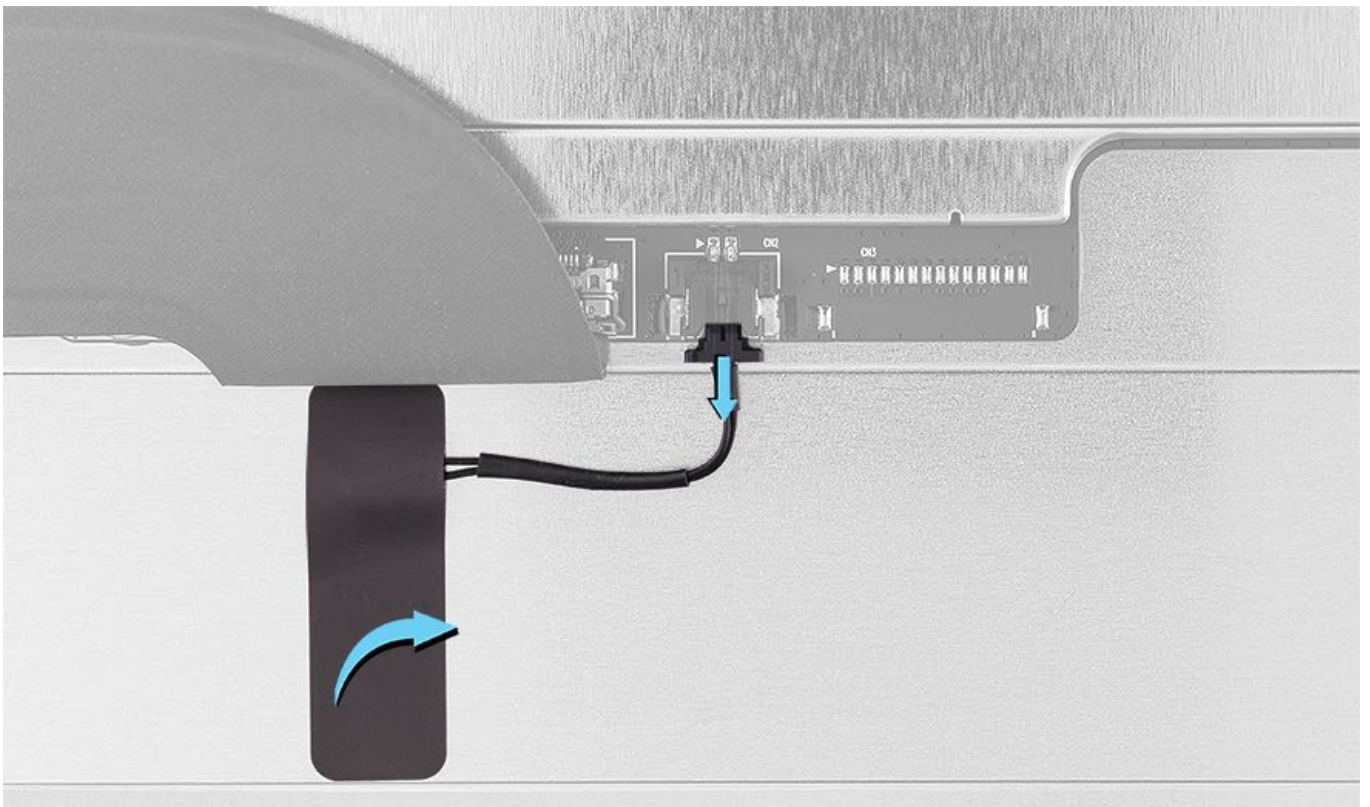
1. Remove any tape that secures the display thermal sensor cable to the display panel.
2. Use the pointed end of a black stick to gently push the display thermal sensor cable out of its connector.
3. Use a black stick to gently pry the square sensor board off the display panel.

**Note:** Depending on the model being serviced, the thermal sensor cable placement is slightly different. Refer to the two images below.

**iMac (21.5-inch, Late 2015 and 2017)**



iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)



### Steps For Reassembly

1. Peel and stick the replacement square sensor board to the back of the display panel.
2. Insert the cable into its connector.
3. Secure the cable with tape.
4. Install new [display panel VHB strips](#).

5. Reinstall the [display panel](#).

# Camera

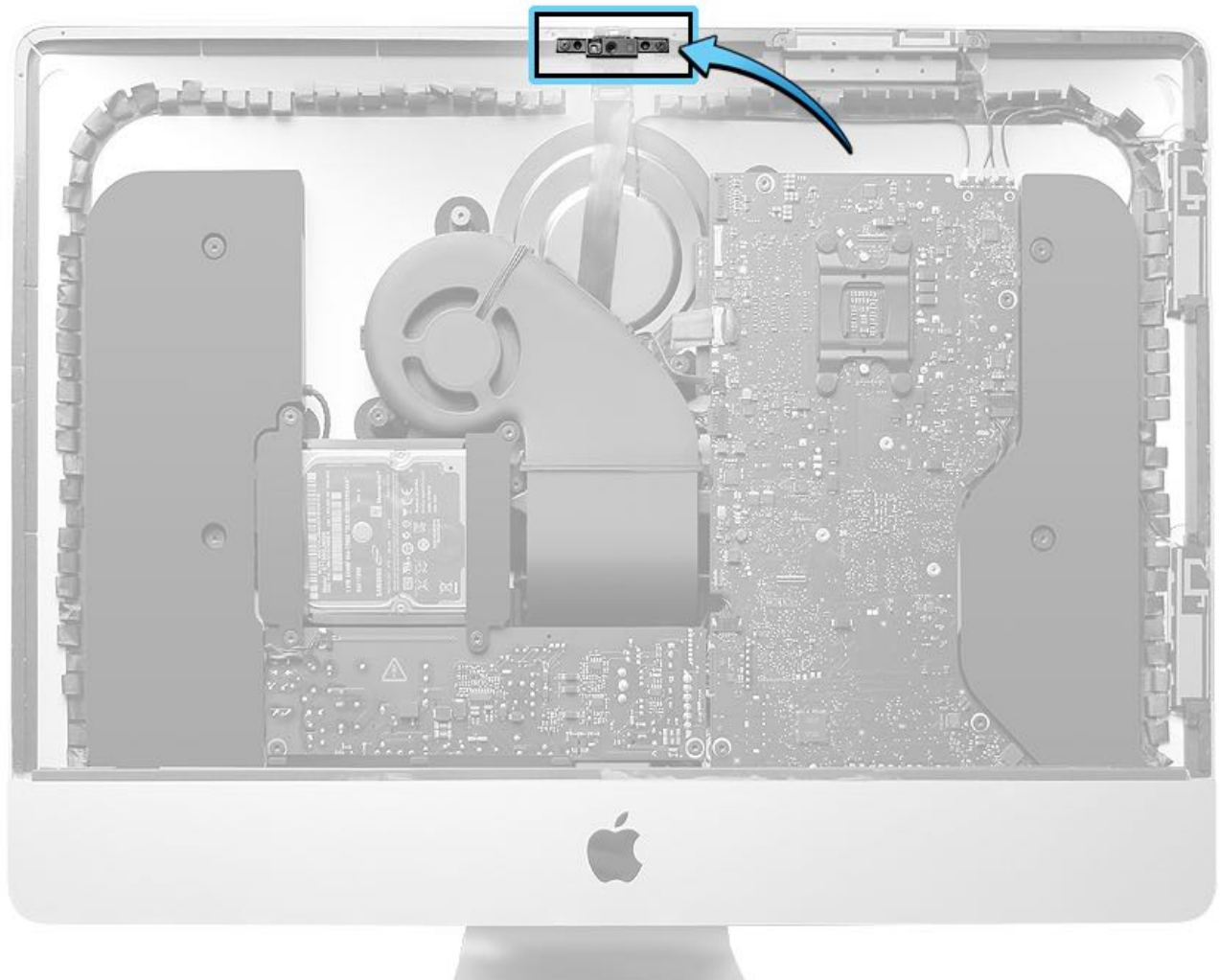
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV234: Camera Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)



## Tools

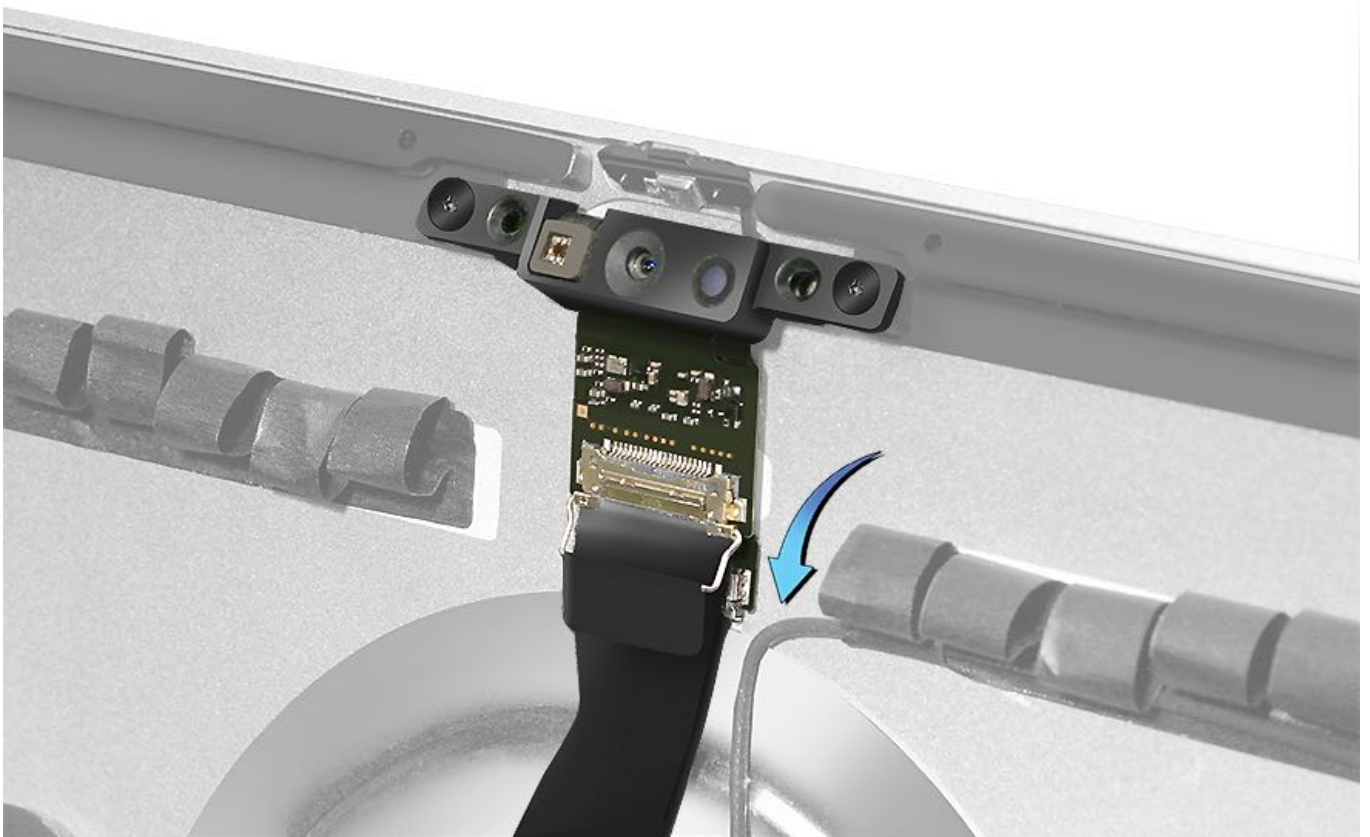
- ESD wrist strap and mat
- Torx T4 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)





## Steps For Removal

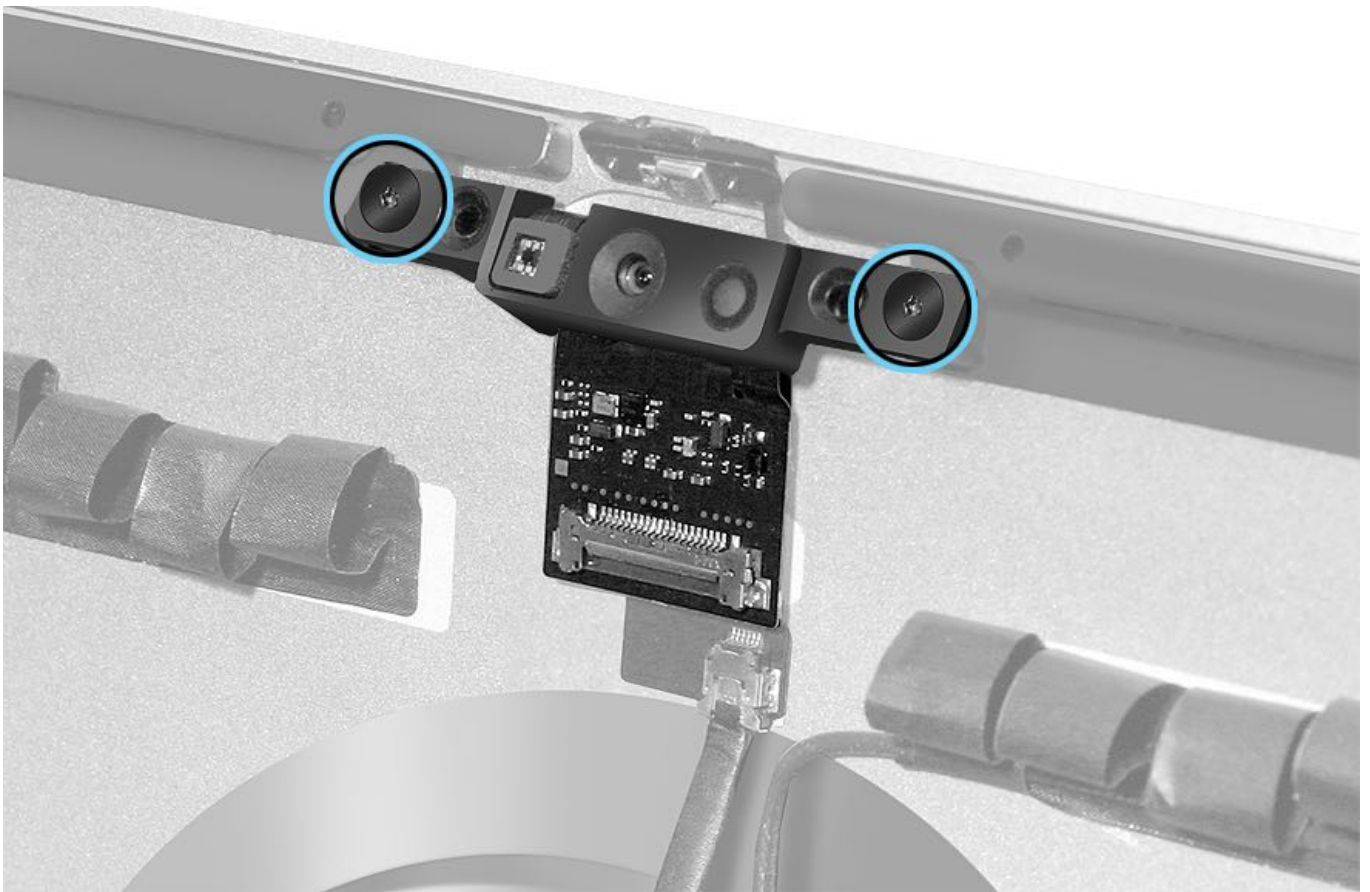
1. Use a black stick to “unlock” the lock bar by gently flipping the bar over toward the cable. Gently pull the cable, not the lock bar, out of the connector.



2. Remove two T4 screws from the camera.

- T4: 923-0339, 3.9 mm



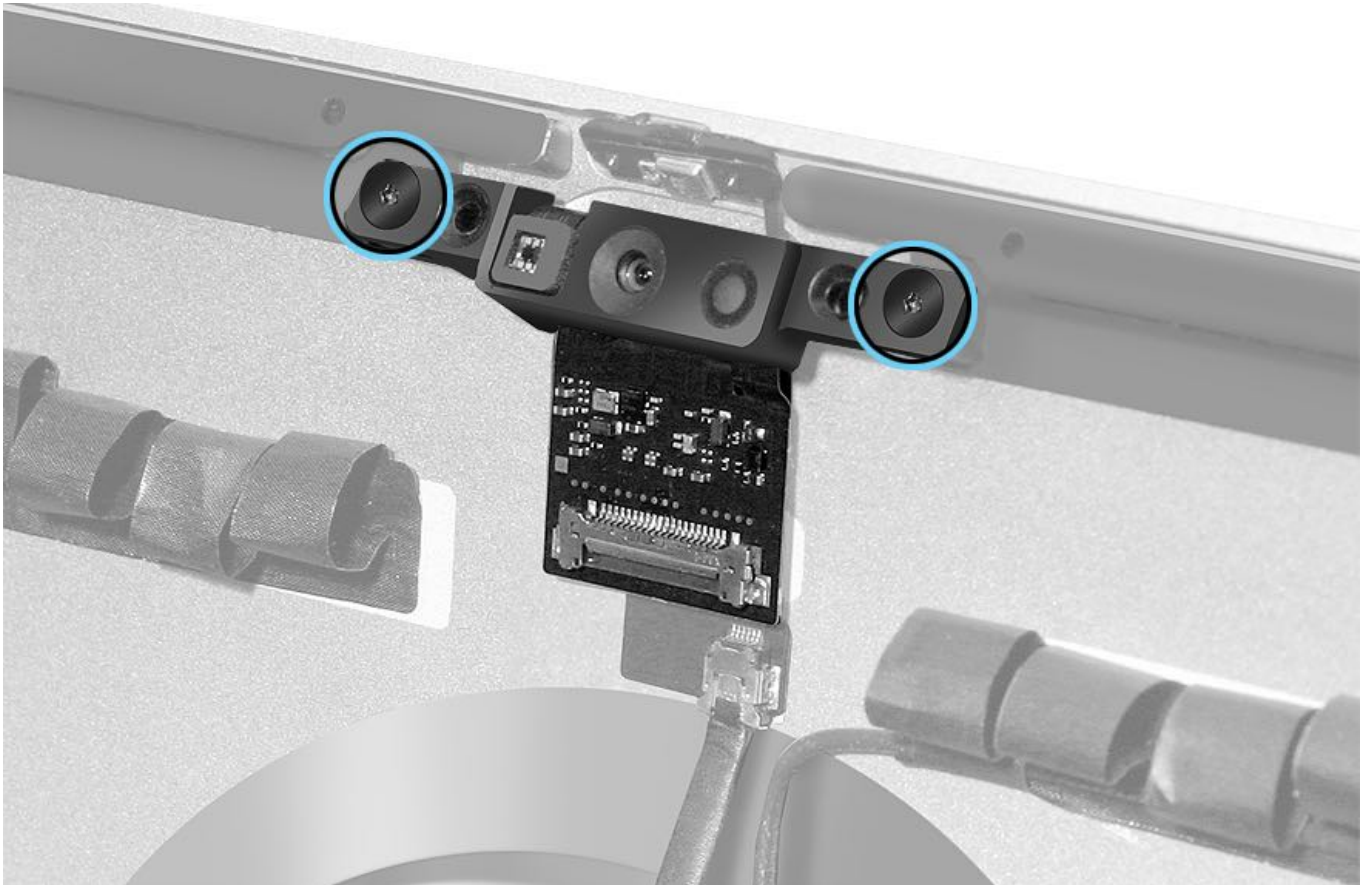


### Steps For Reassembly

1. Install two T4 screws.

- T4: 923-0339, 3.9 mm

**Note:** If installing a replacement camera, then do not forget to remove the protective film covering the lens.



2. Carefully insert the camera cable into the connector. Check that the cable is firmly inserted into the connector.

3. Flip the lock bar up.

**Important:** Press around the edges of the lock bar to secure the camera cable.



4. Install new [display panel VHB strips](#).

5. Reinstall the [display panel](#).

# Camera/Microphone Cable

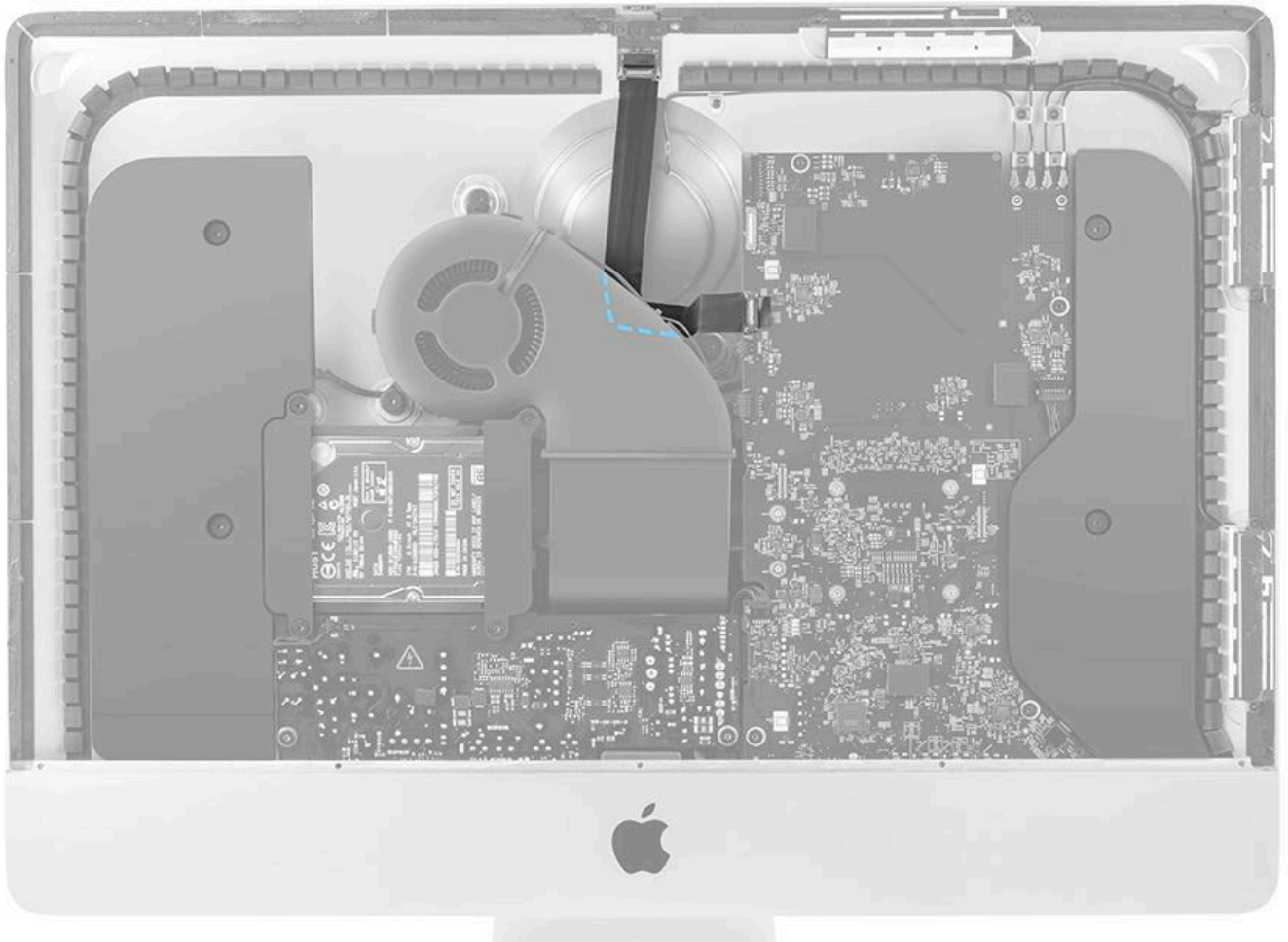
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

For video instruction, refer to article [SV250: Camera/Microphone Cable Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)



## Tools

- ESD wrist strap and mat
- Black stick
- Service wedge (iMac)



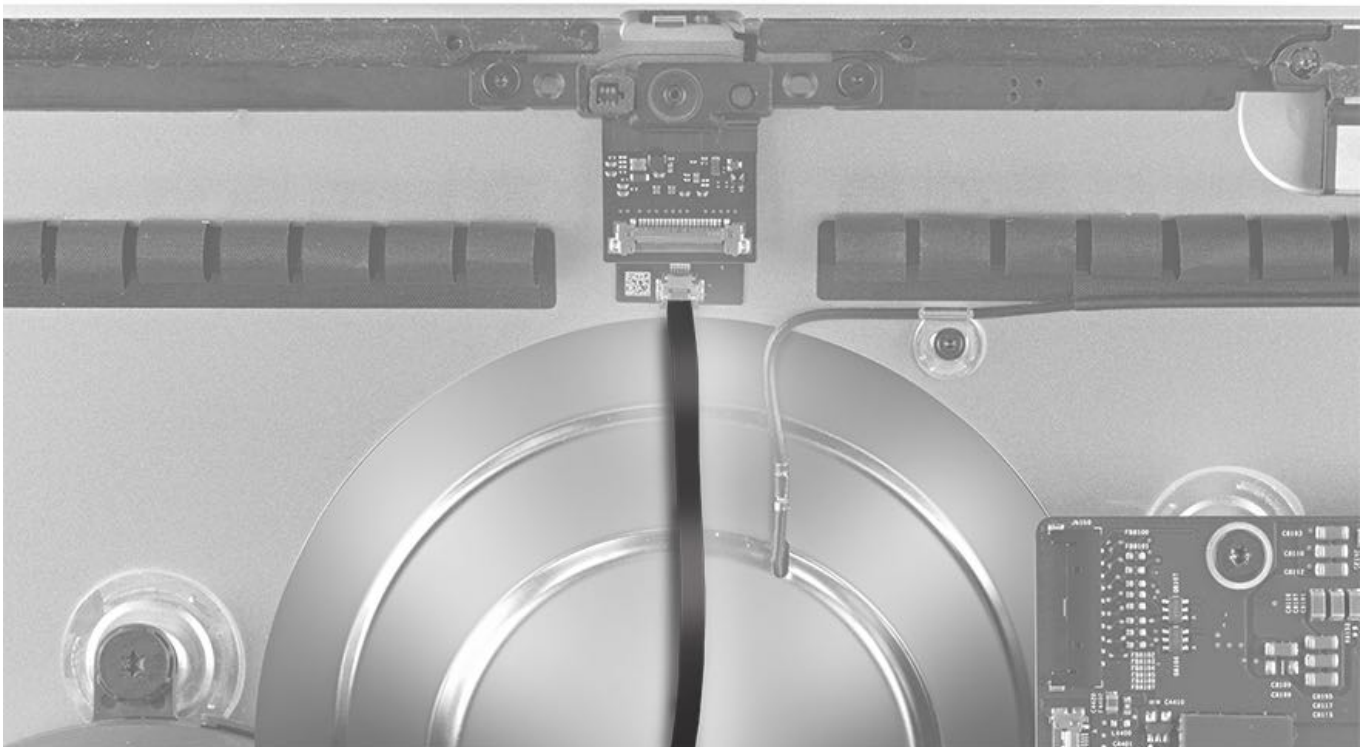


## Steps For Removal

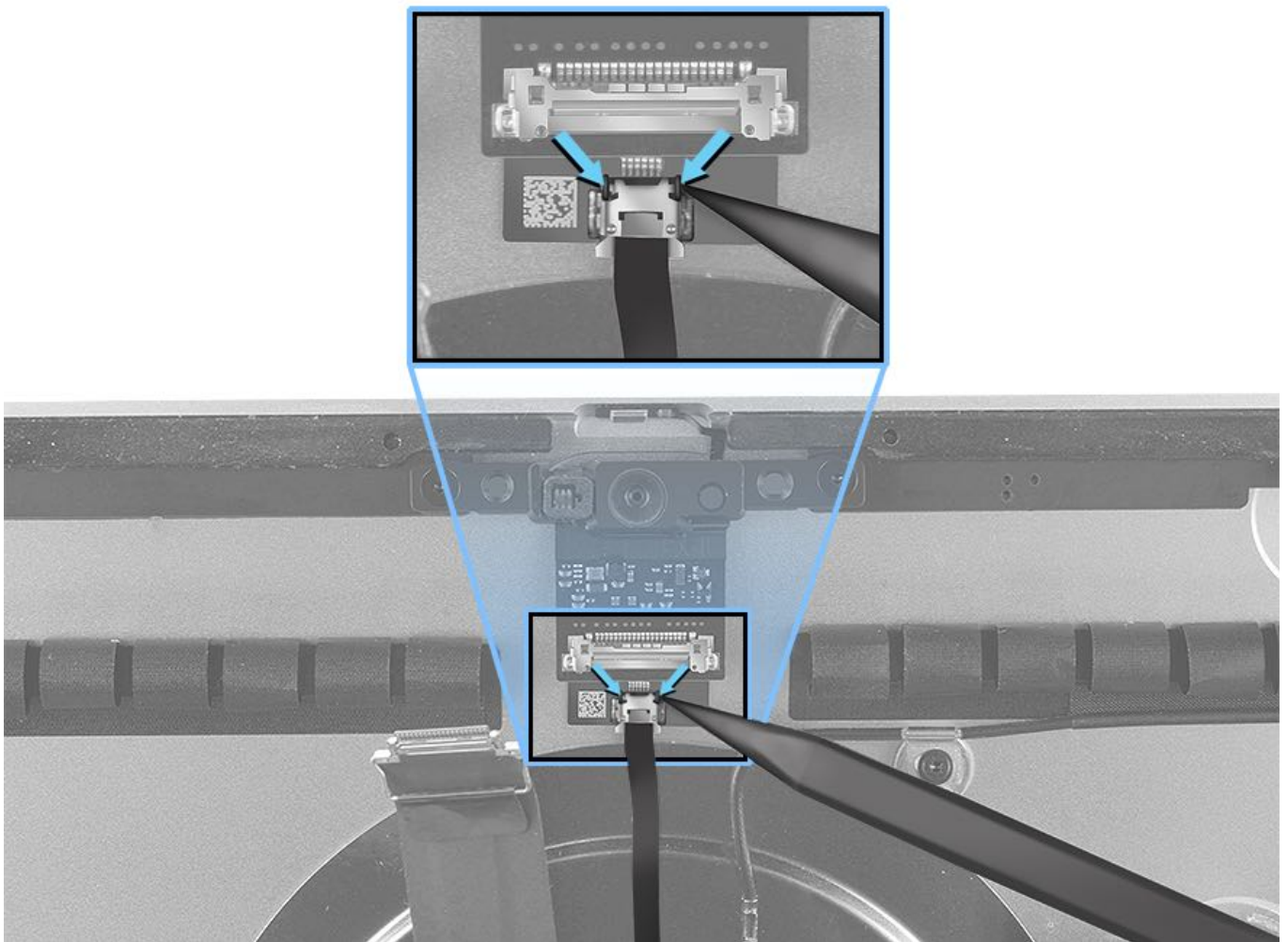
1. Use a black stick to “unlock” the locking-lever bar on the camera cable.
2. Pull the camera cable straight out from the connector on the camera board.



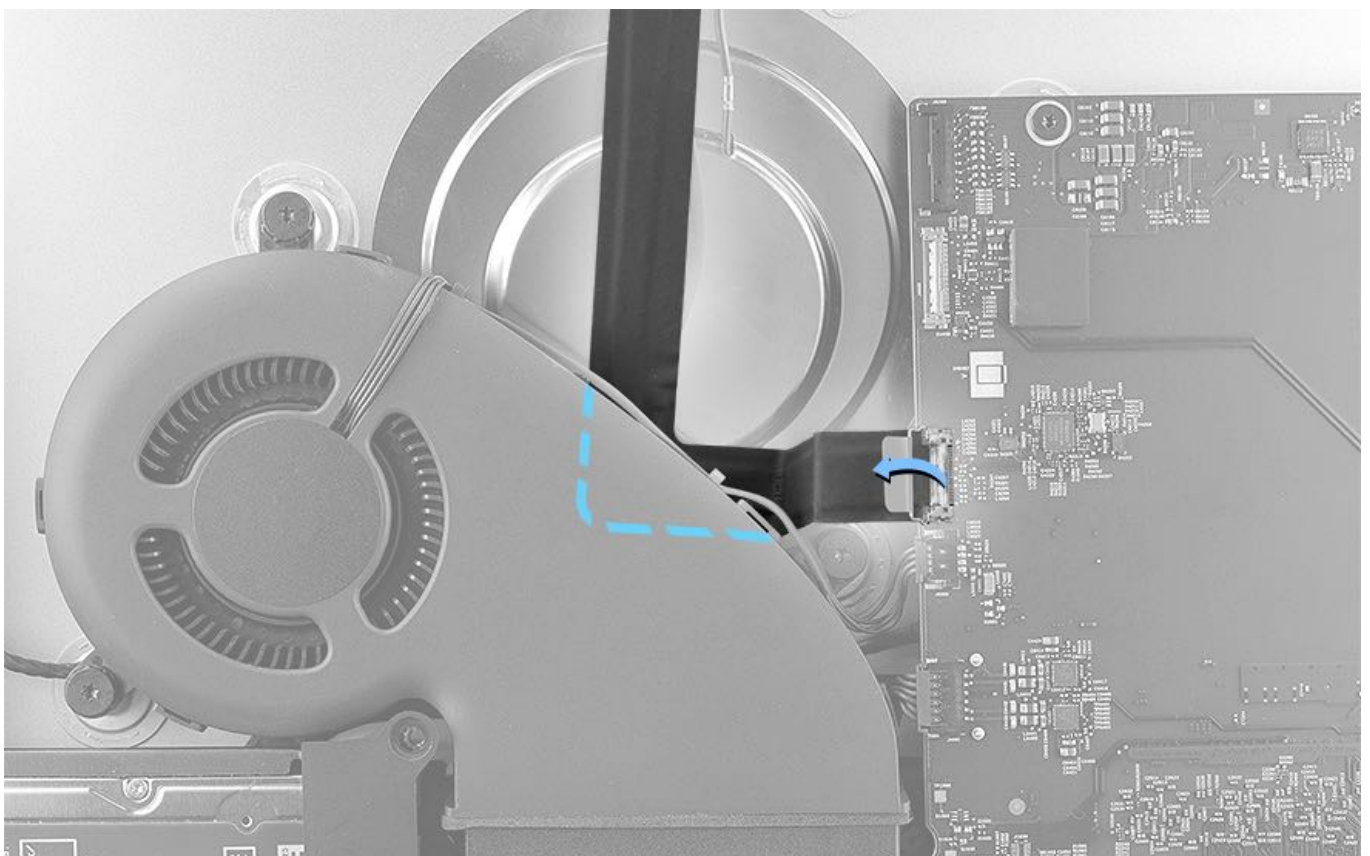
**Note:** The microphone cable is behind and attached to the camera cable. Pull the camera cable down enough to reveal the microphone cable. (The camera cable is moved for visibility in the image below.)



3. Use a black stick to disconnect the microphone cable.



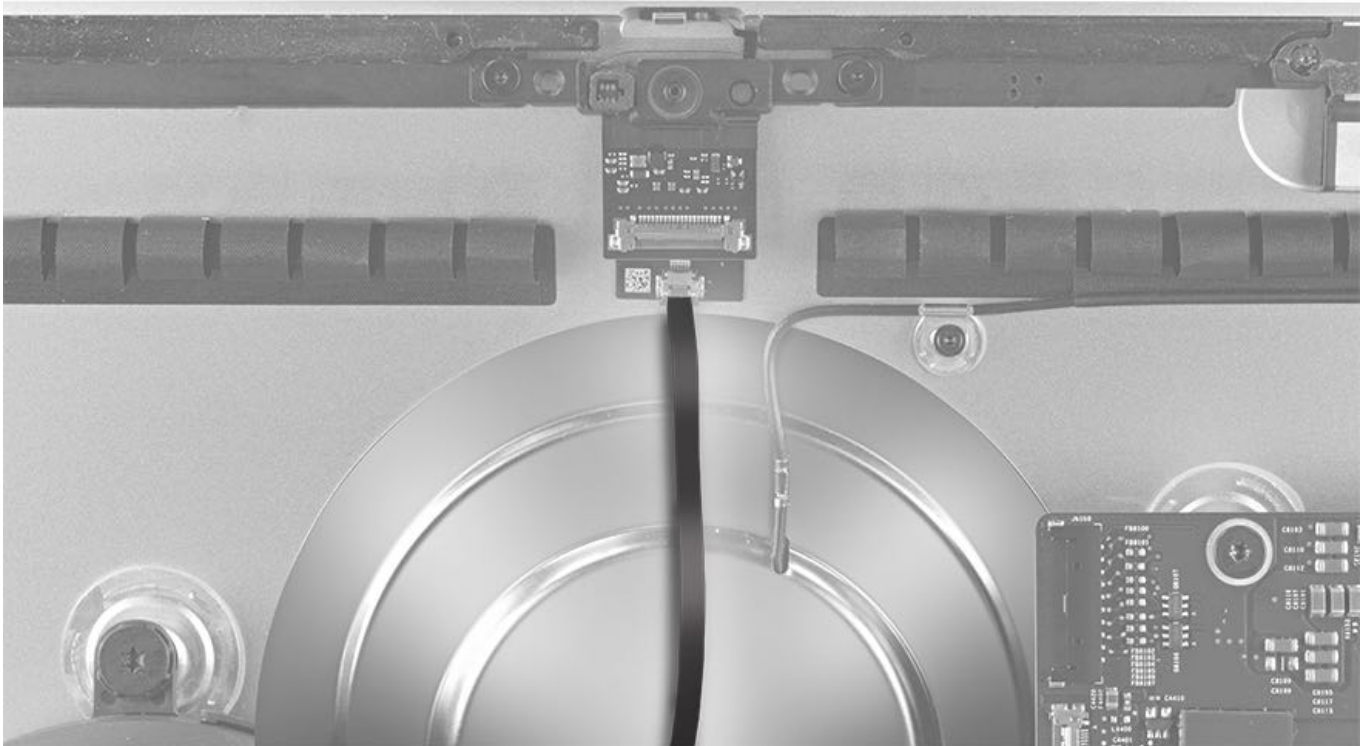
4. Disconnect the camera/microphone cable from the logic board. Flip the locking-lever bar back and pull the cable straight out of the connector.



## Steps For Reassembly

1. Connect the microphone cable.





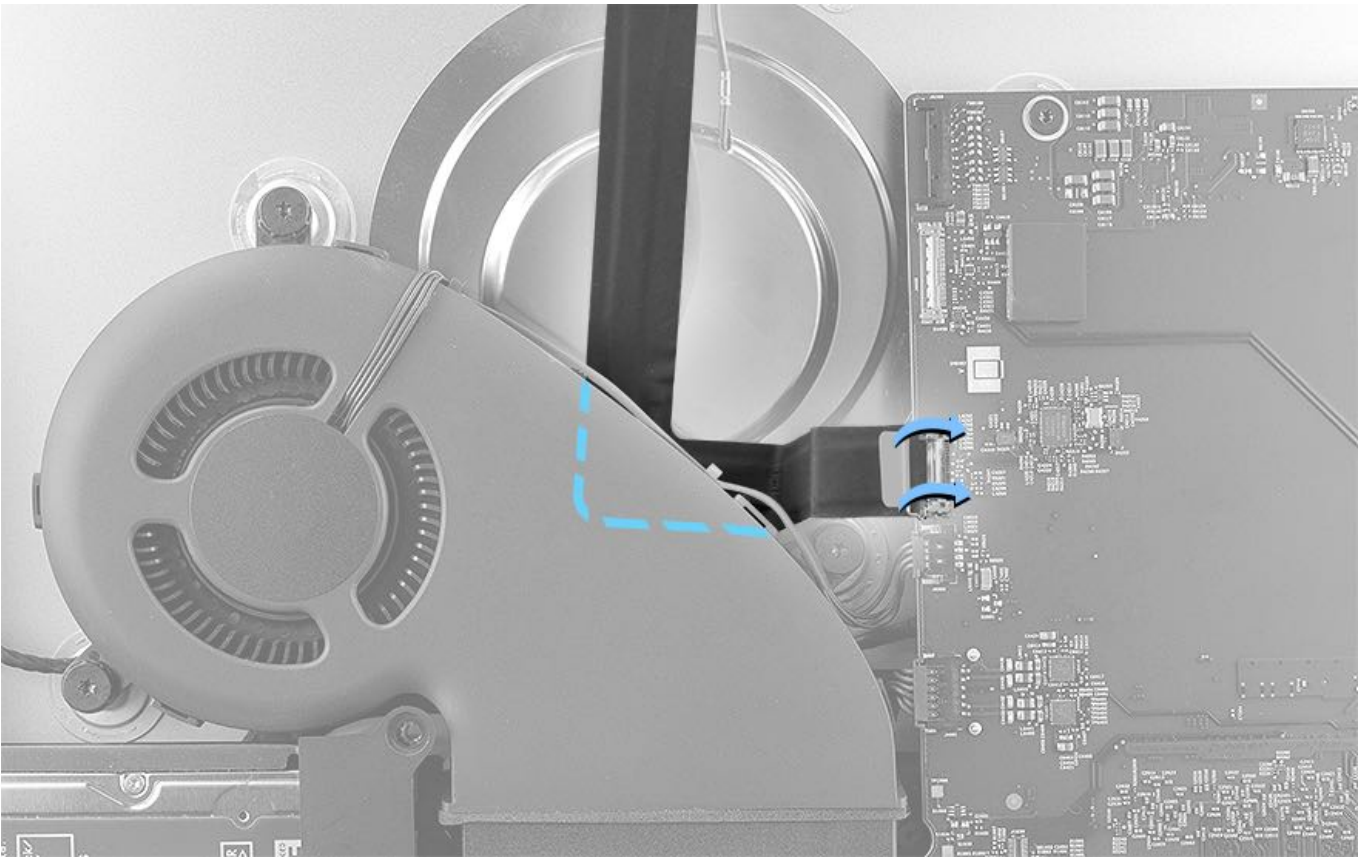
2. Connect the camera cable to the camera board. Flip the locking-lever bar up and gently press on both sides of the lever simultaneously to securely fasten the lever.

3. Press along the cable to adhere it to the rear housing.



4. Insert the cable into the logic board connector and flip the locking-lever bar down.

**Important:** Press down around the locking-lever bar to securely lock the cable connector in place.



5. Install new [display panel VHB strips](#).

6. Reinstall the [display panel](#).

# Bluetooth Antenna

## First Steps

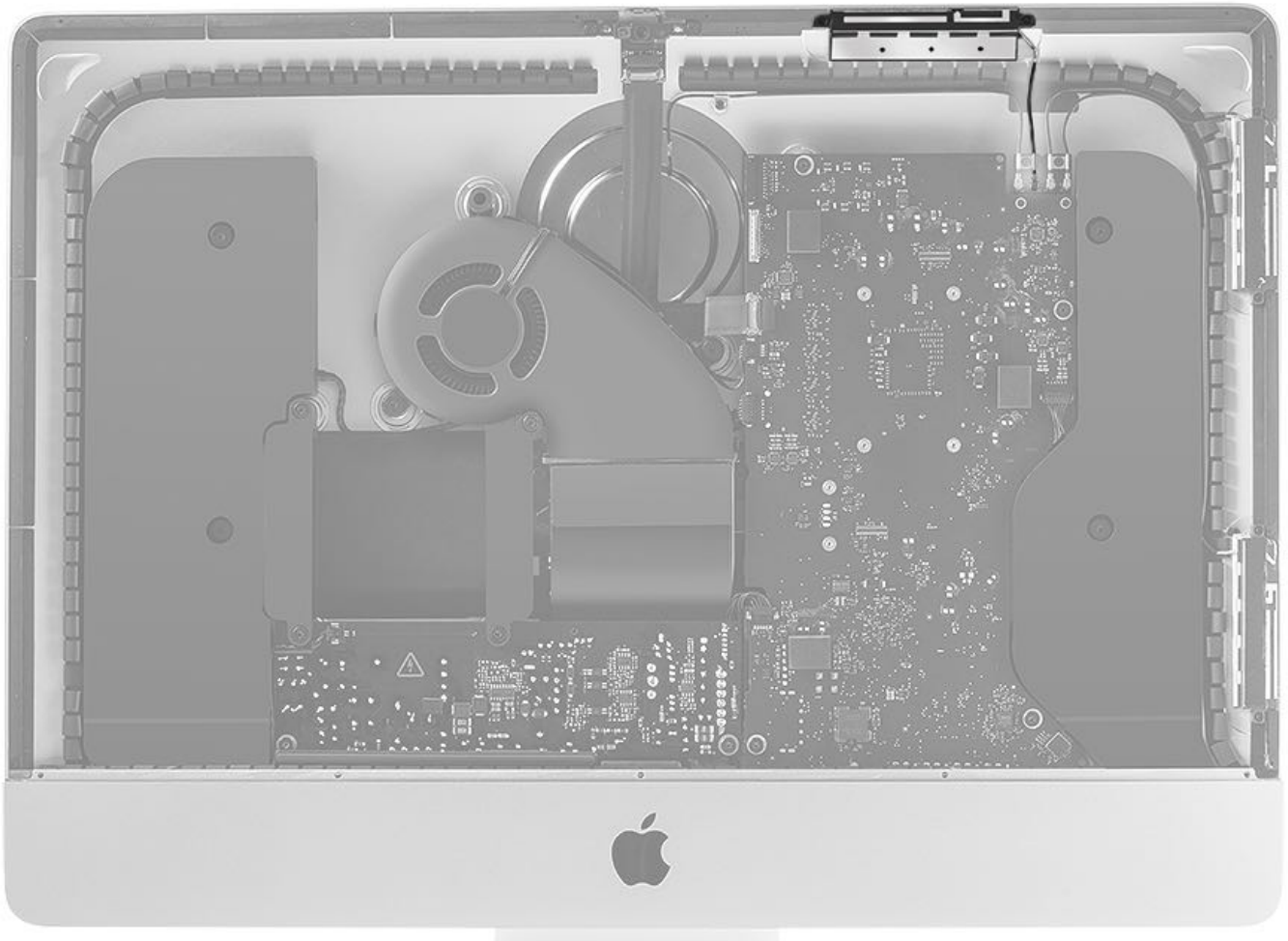
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV298: Bluetooth and Wi-Fi Antenna Replacement Video](#). (Late 2015 models only)

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

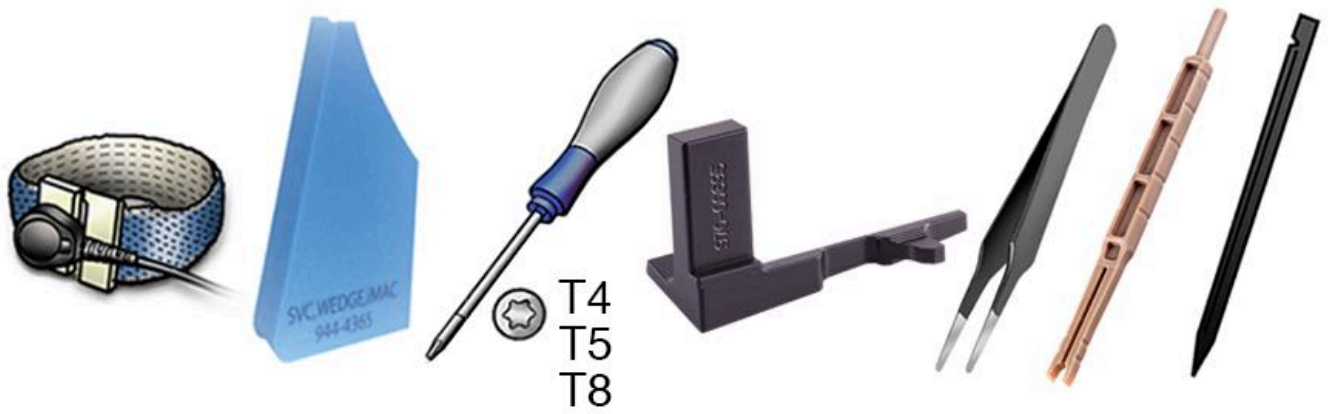
**Note:** Images of the iMac (21.5-inch, Late 2015) model are shown for this procedure.



## Tools

- ESD wrist strap and mat
- Service wedge (iMac)
- Torx T8 screwdriver (magnetized)
- Torx T5 screwdriver (magnetized)
- Torx T4 screwdriver (magnetized)
- Wireless card support tool (923-01806)
- ESD-safe tweezers or antenna tool (923-01322)
- Black stick



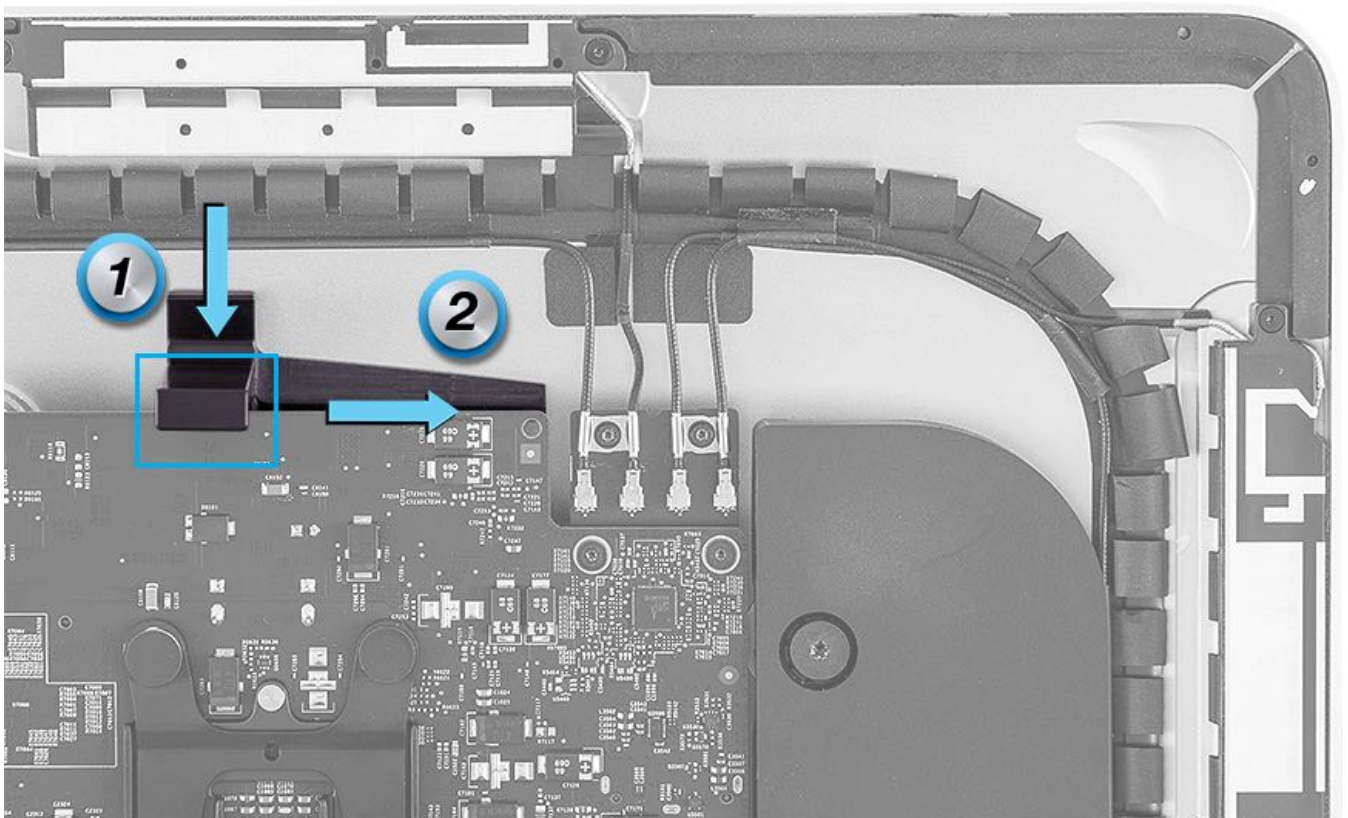


## Steps For Removal

**Important:** The iMac (21.5-inch, 2017) wireless support tool (923-01806) can be used when servicing both the iMac (Late 2015) and iMac (2017), but **do not** use the iMac (Late 2015) wireless support tool (923-00774) when servicing iMac (2017) models. The iMac (Late 2015) tool could damage components on the back side of the iMac (2017) logic board.

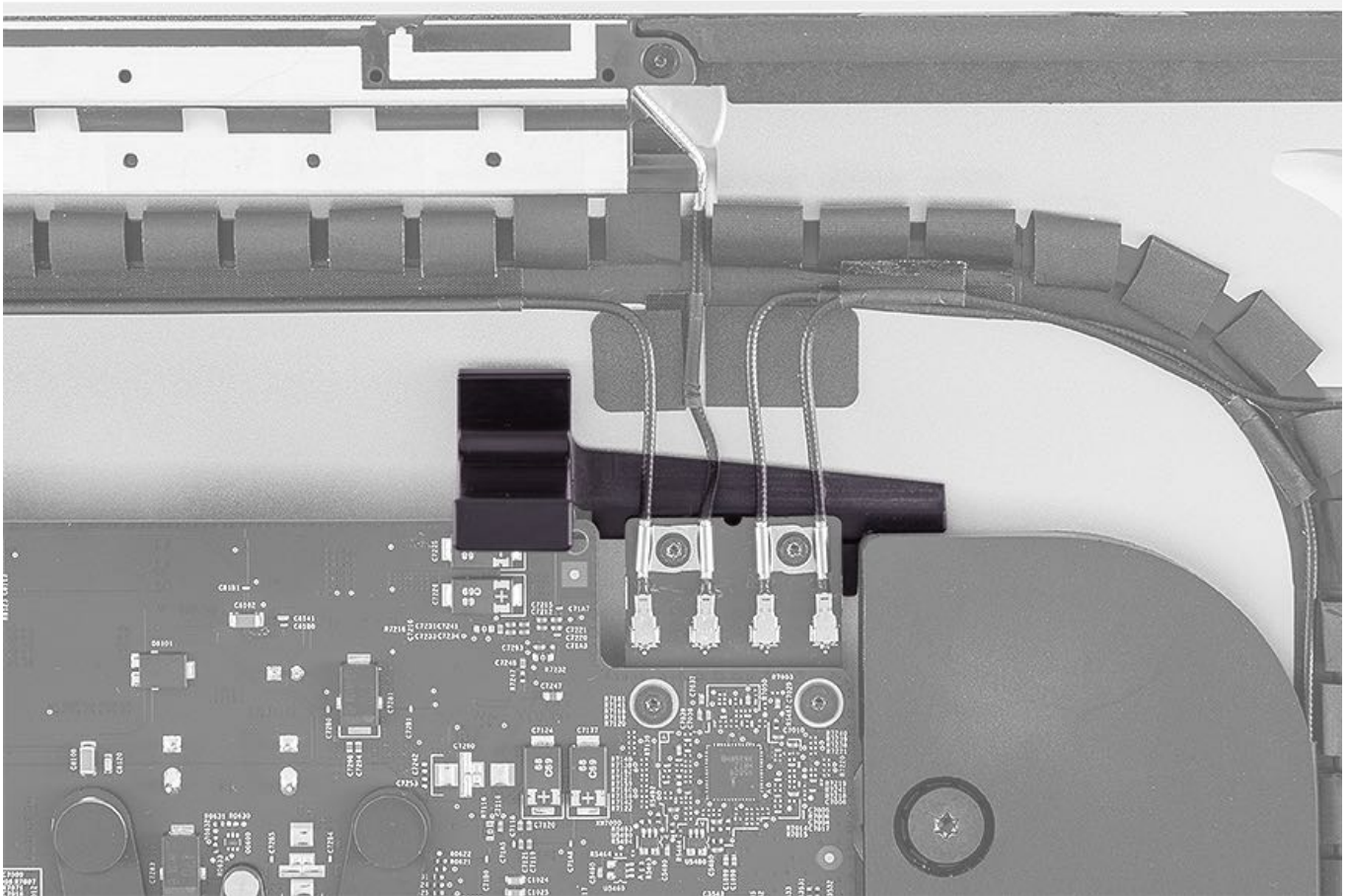
iMac (2017) wireless support tool (923-01806)	iMac (Late 2015) wireless support tool (923-00774)

1. Holding the tool by the handle (item in the square), lower the tool (1) so it rests on the edge of the logic board, then slide the tool to the right (2) behind the wireless card (see step 2).



2. This image shows the wireless card support tool installed correctly.

**Note:** Keep the wireless support tool in position while removing or replacing screws and disconnecting or reconnecting antenna cables.

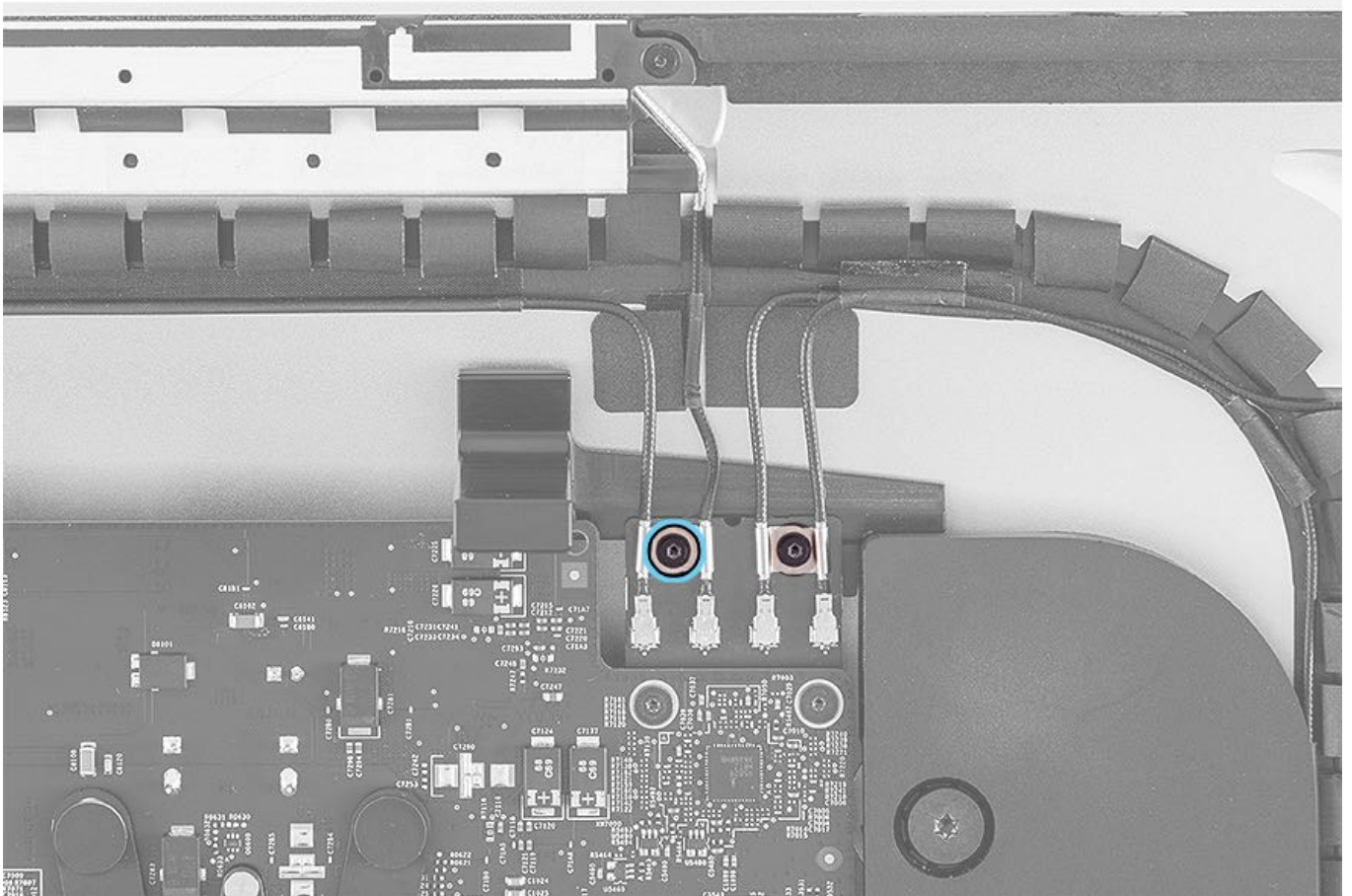


3. Remove one T5 screw from the wireless antenna bracket.

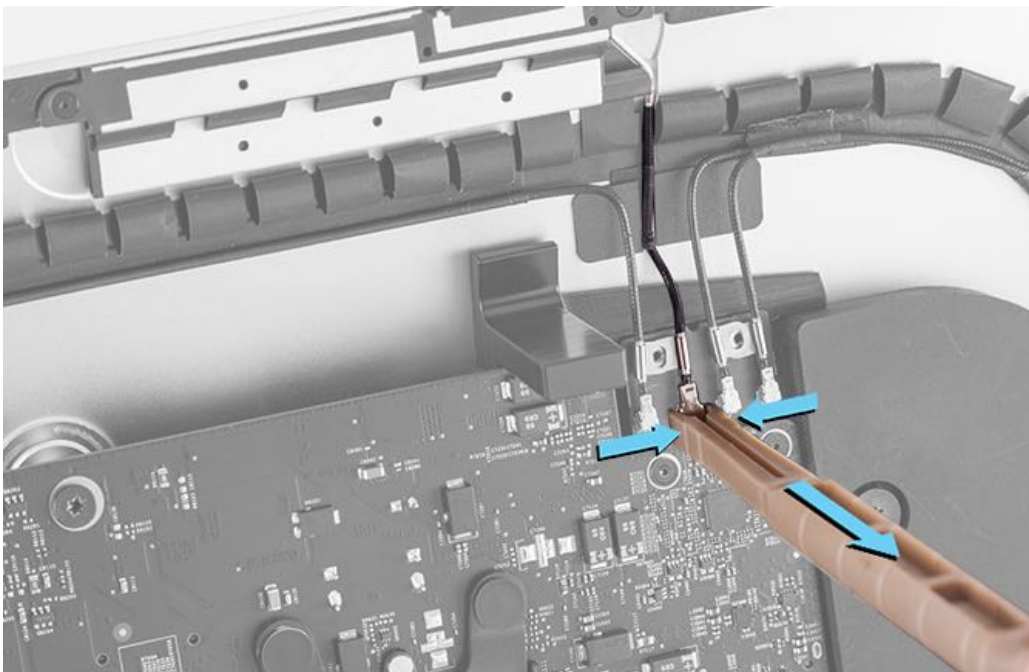
- T5: 923-00609, 3.8 mm



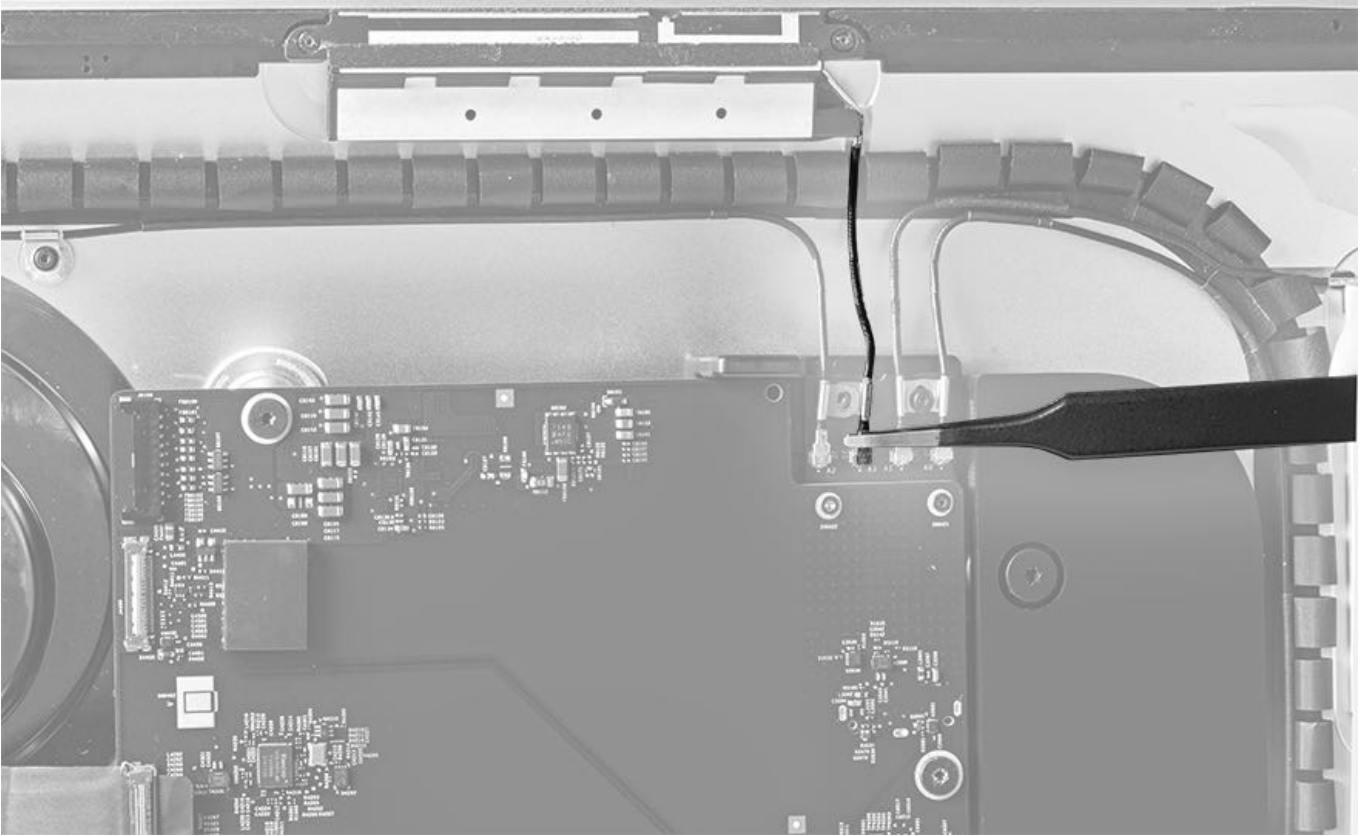




4. Use the antenna tool or ESD-safe tweezers to disconnect the connector from the wireless card.



**Note:** Avoid using a metal tool that could crimp or damage the cable.

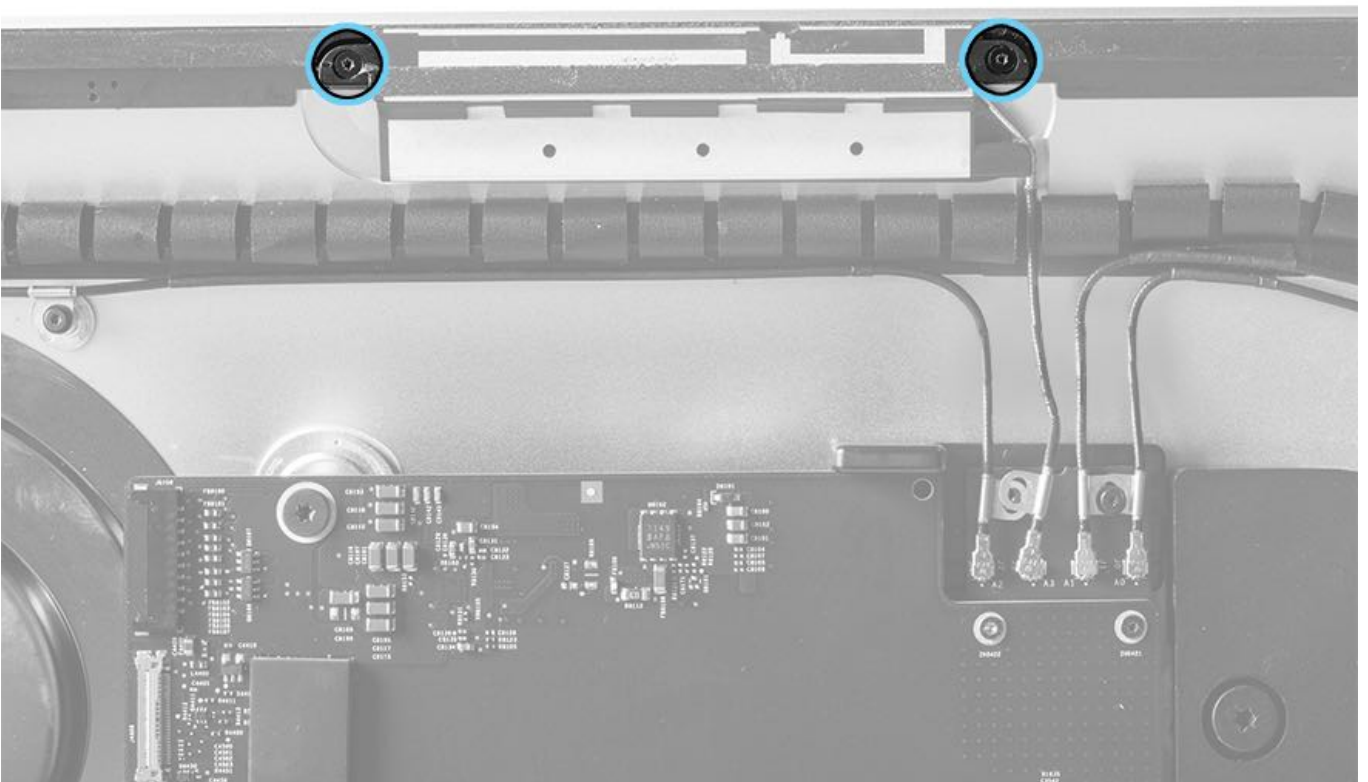


5. Remove the two T4 screws that secure the antenna body to the rear housing.

- T4: 923-00831



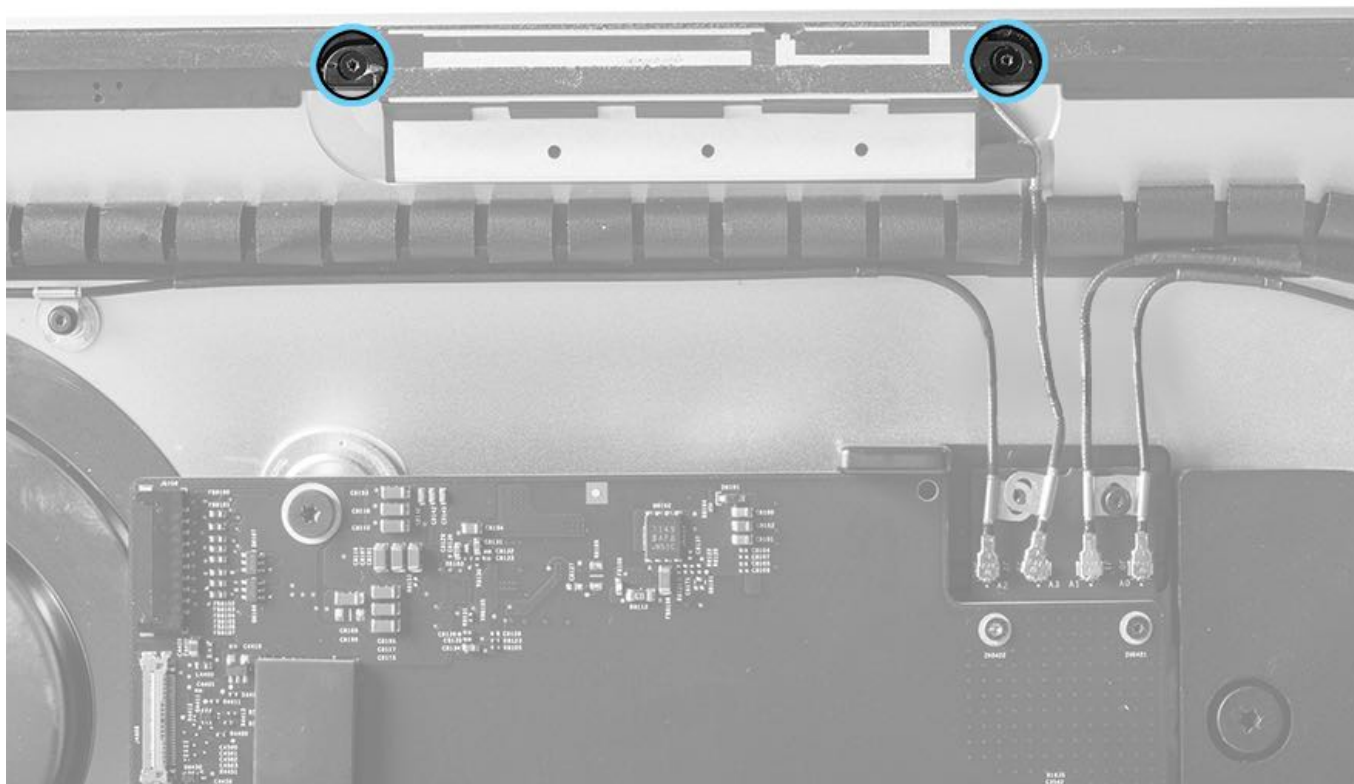
6. Remove the Bluetooth antenna from the computer assembly.



## Steps For Reassembly

1. Install two T4 screws to secure the antenna body to the rear housing.

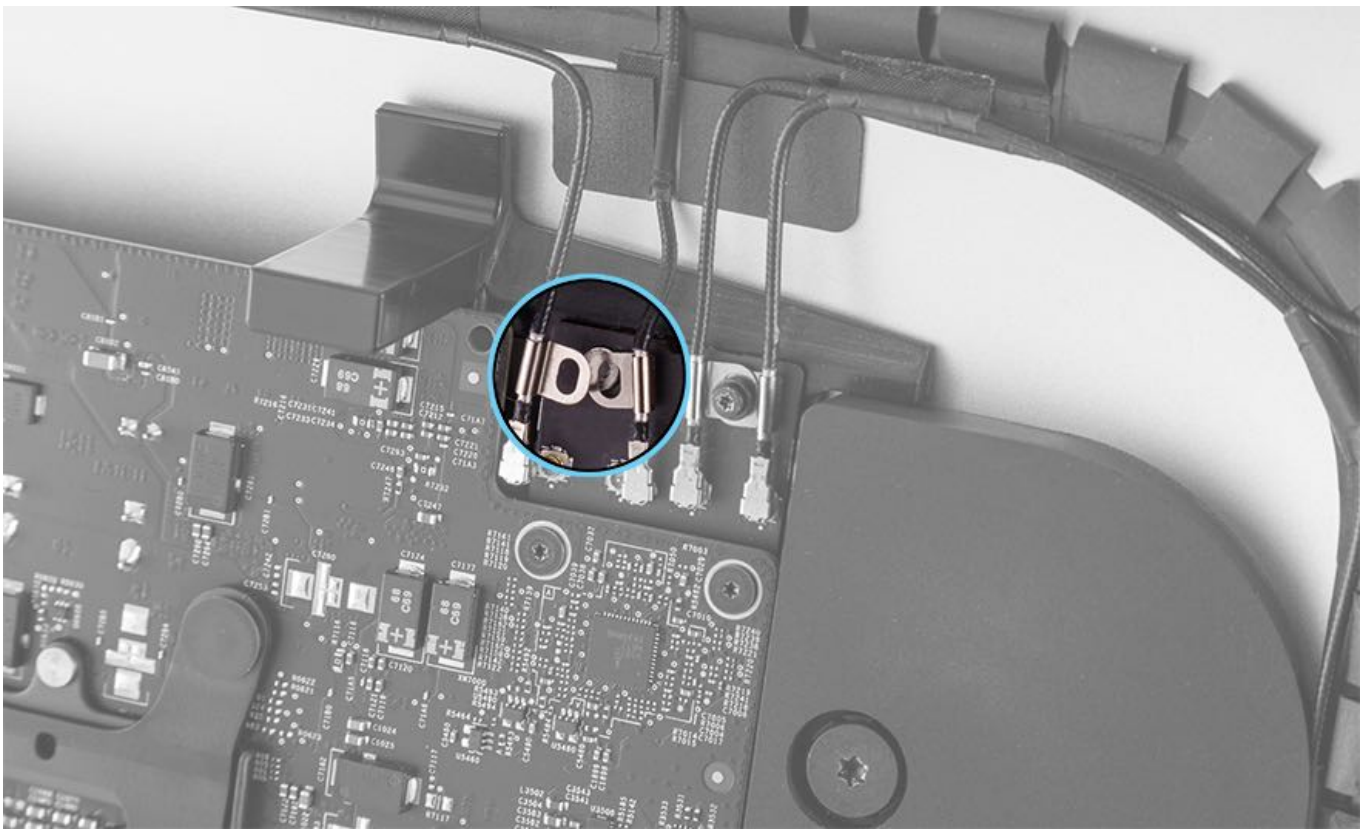
- T4: 923-00831



2. Route the antenna cable to the wireless card.

3. Slide the right bracket under the left bracket.

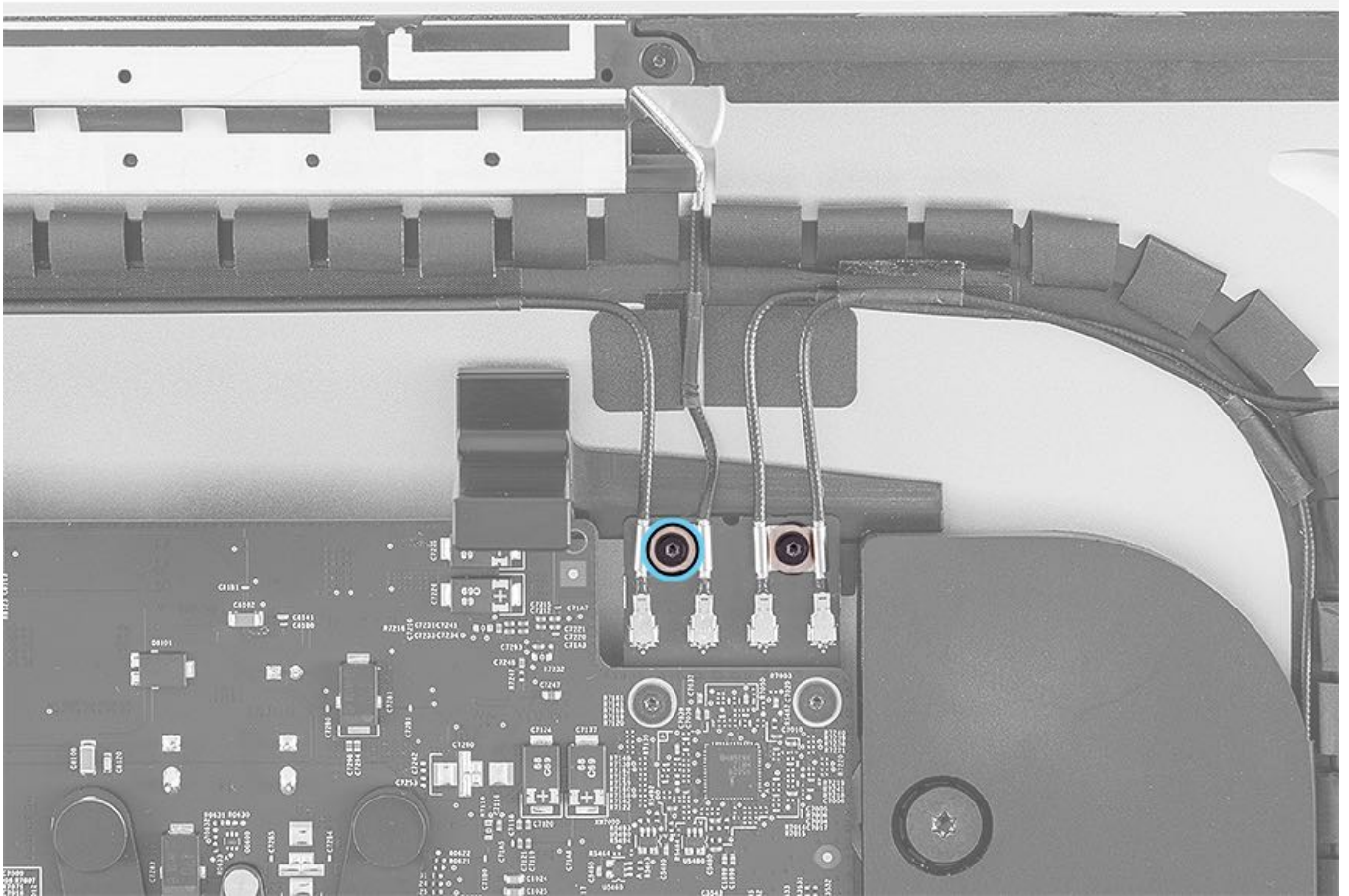




4. Install one T5 screw to the wireless antenna bracket.

- T5: 923-00609, 3.8 mm





5. Use the antenna tool or ESD-safe tweezers to connect the cable to the wireless card.
6. Remove the wireless card support tool from the rear housing.
7. Install new [display panel VHB strips](#).
8. Reinstall the [display panel](#).



# Middle Wi-Fi Antenna

## First Steps

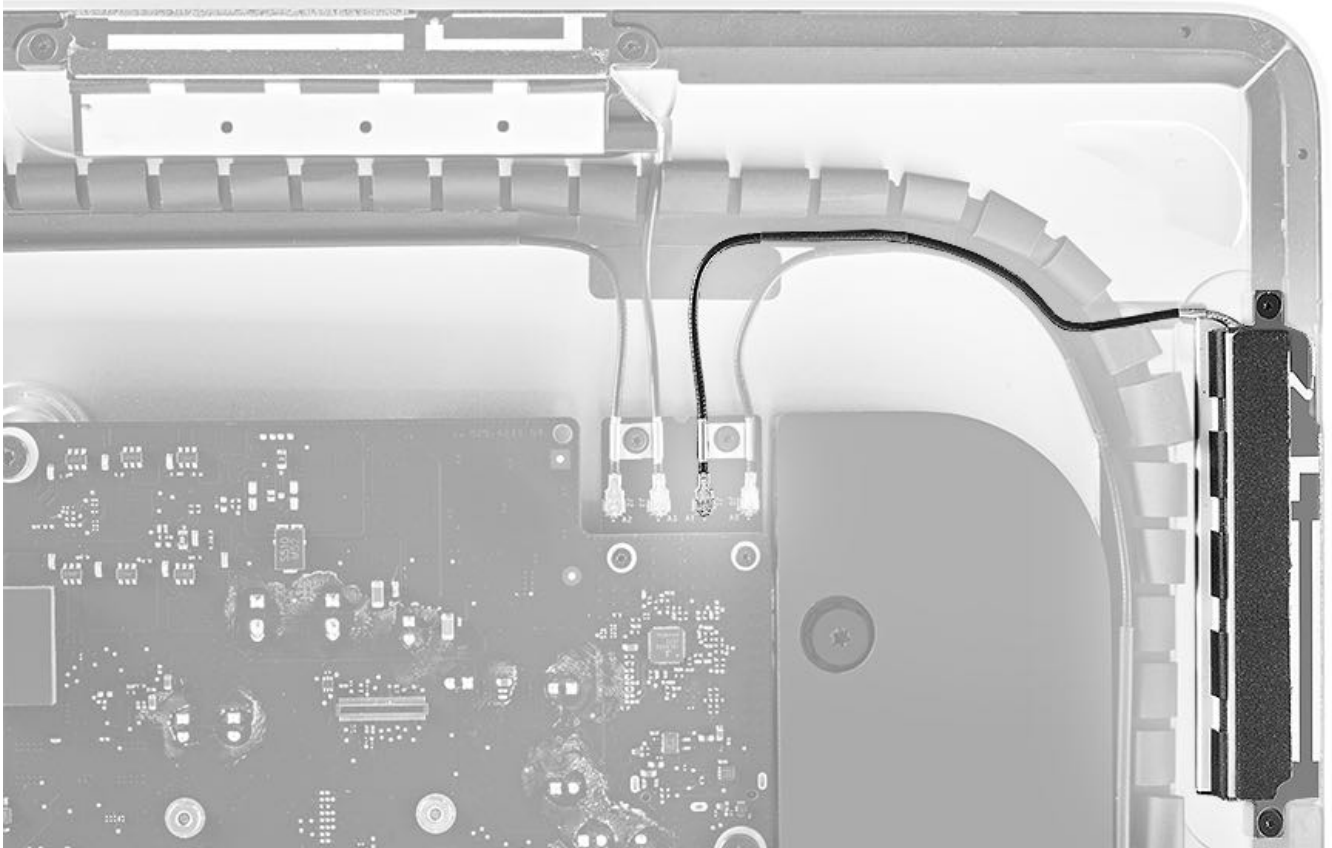
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV298: Bluetooth and Wi-Fi Antenna Replacement Video](#). (Late 2015 models only)

Remove:

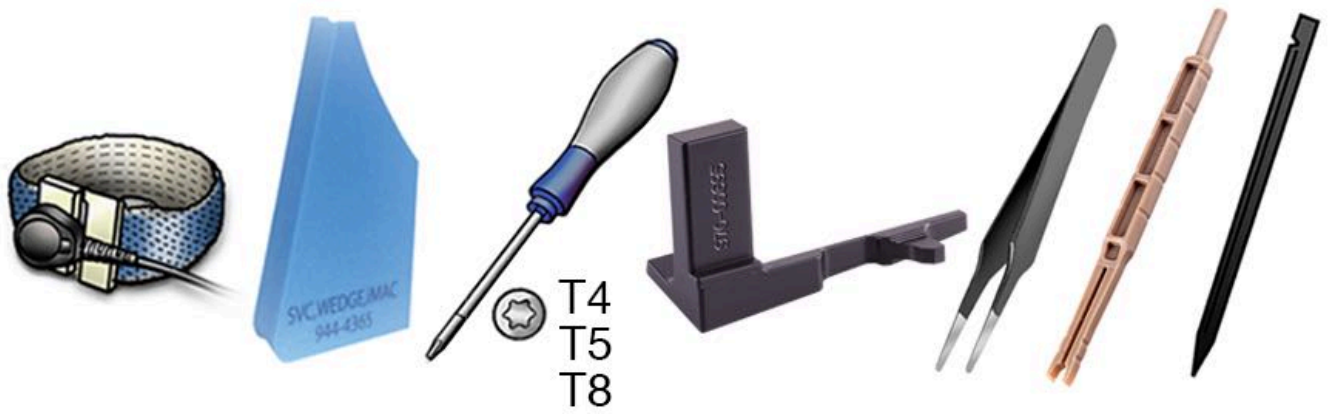
- [Display panel](#)
- [Display panel VHB strips](#)

**Note:** Images of the iMac (21.5-inch, Late 2015) model are shown for this procedure.



## Tools

- ESD wrist strap and mat
- Service wedge (iMac)
- Torx T8 screwdriver (magnetized)
- Torx T5 screwdriver (magnetized)
- Torx T4 screwdriver (magnetized)
- Wireless card support tool (923-01806)
- ESD-safe tweezers or antenna tool (923-01322)
- Black stick

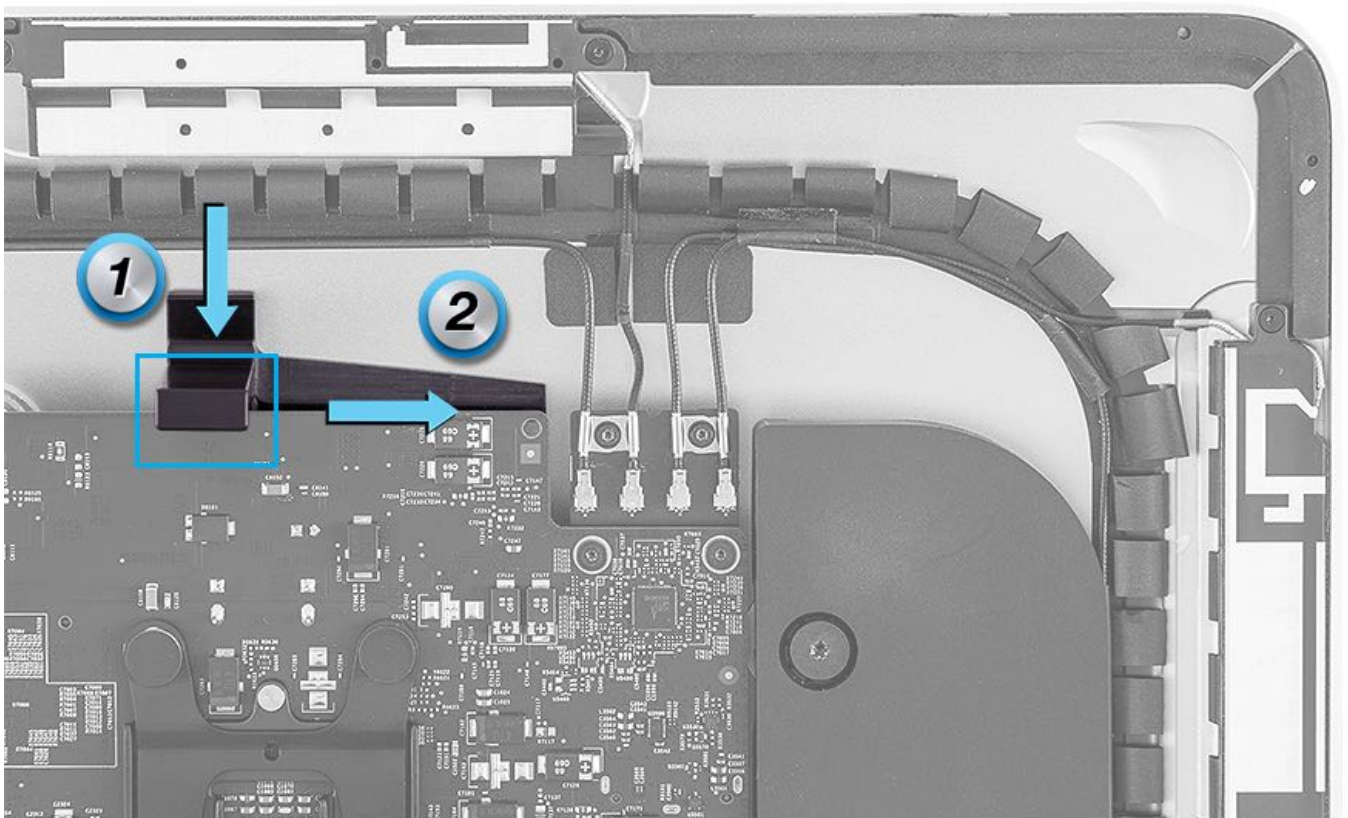


## Steps For Removal

**Important:** The iMac (21.5-inch, 2017) wireless support tool (923-01806) can be used when servicing both the iMac (Late 2015) and iMac (2017), but **do not** use the iMac (Late 2015) wireless support tool (923-00774) when servicing iMac (2017) models. The iMac (Late 2015) tool could damage components on the back side of the iMac (2017) logic board.

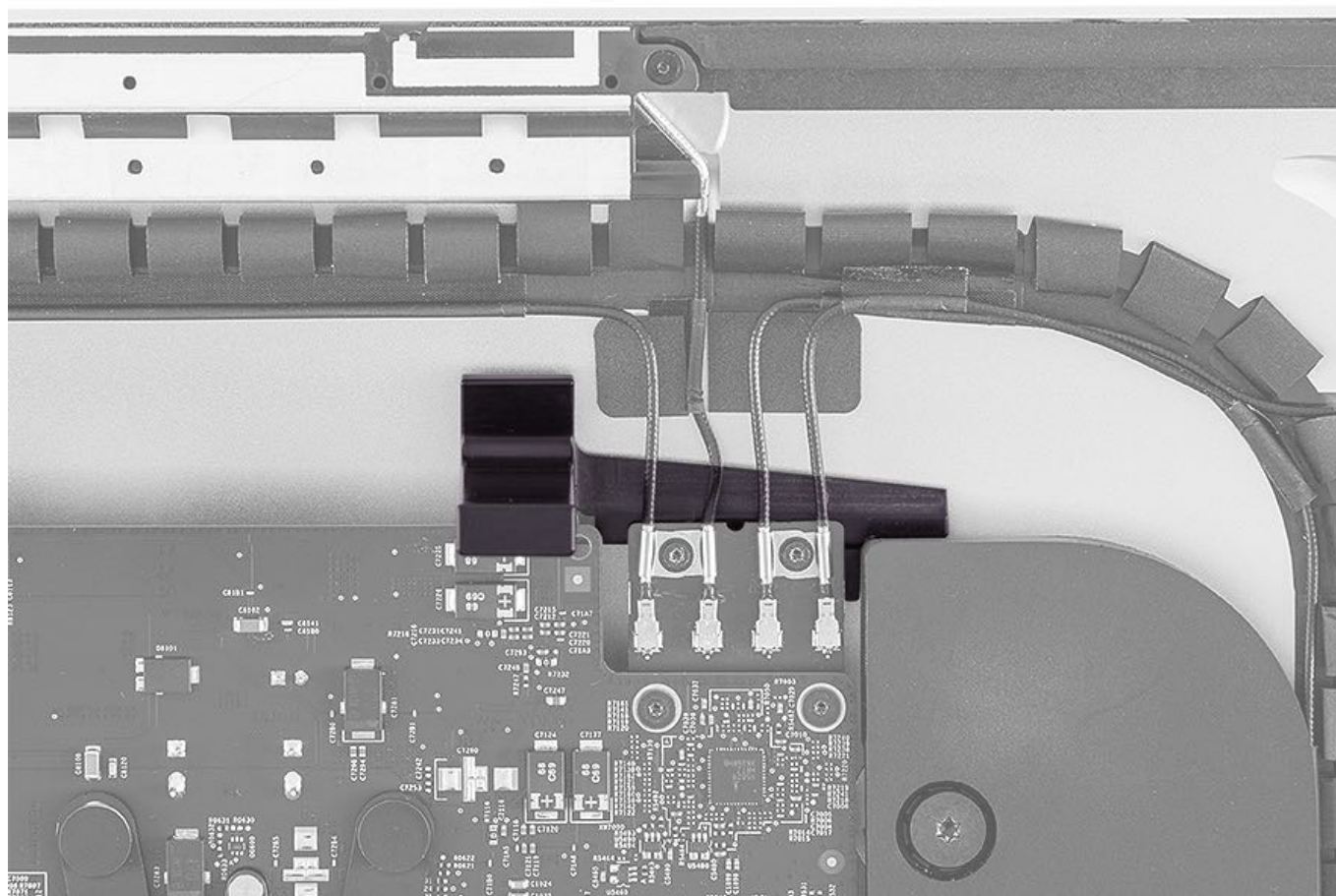
iMac (2017) wireless support tool (923-01806)	iMac (Late 2015) wireless support tool (923-00774)

1. Holding the tool by the handle (item in the square), lower the tool (1) so it rests on the edge of the logic board, then slide the tool to the right (2) behind the wireless card (see step 2).



2. This image shows the wireless card support tool installed correctly.

**Note:** Keep the wireless support tool in position while removing or replacing screws and disconnecting or reconnecting antenna cables.

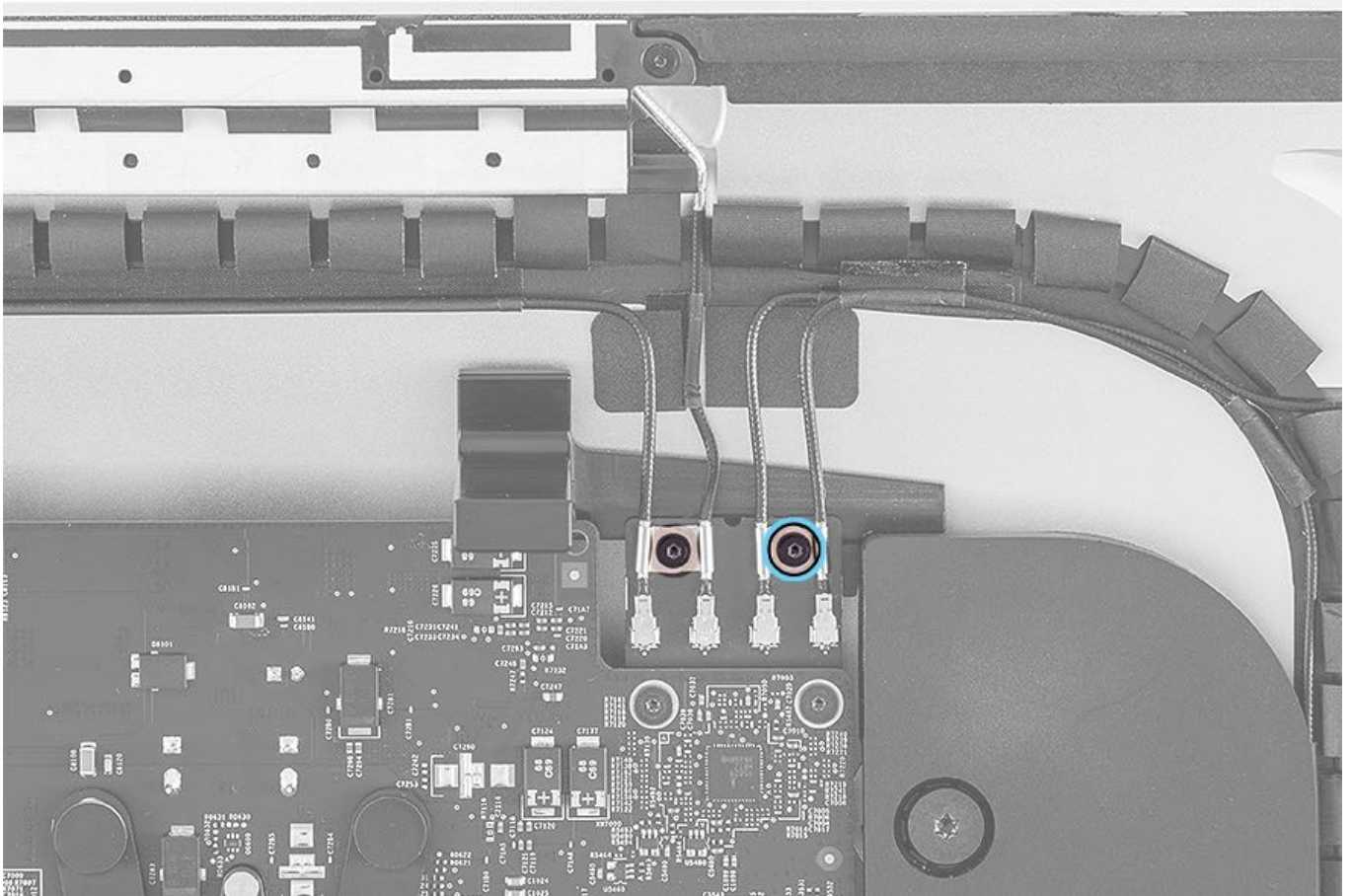


3. Remove one T5 screw from the wireless antenna bracket.

- T5: 923-00609, 3.8 mm

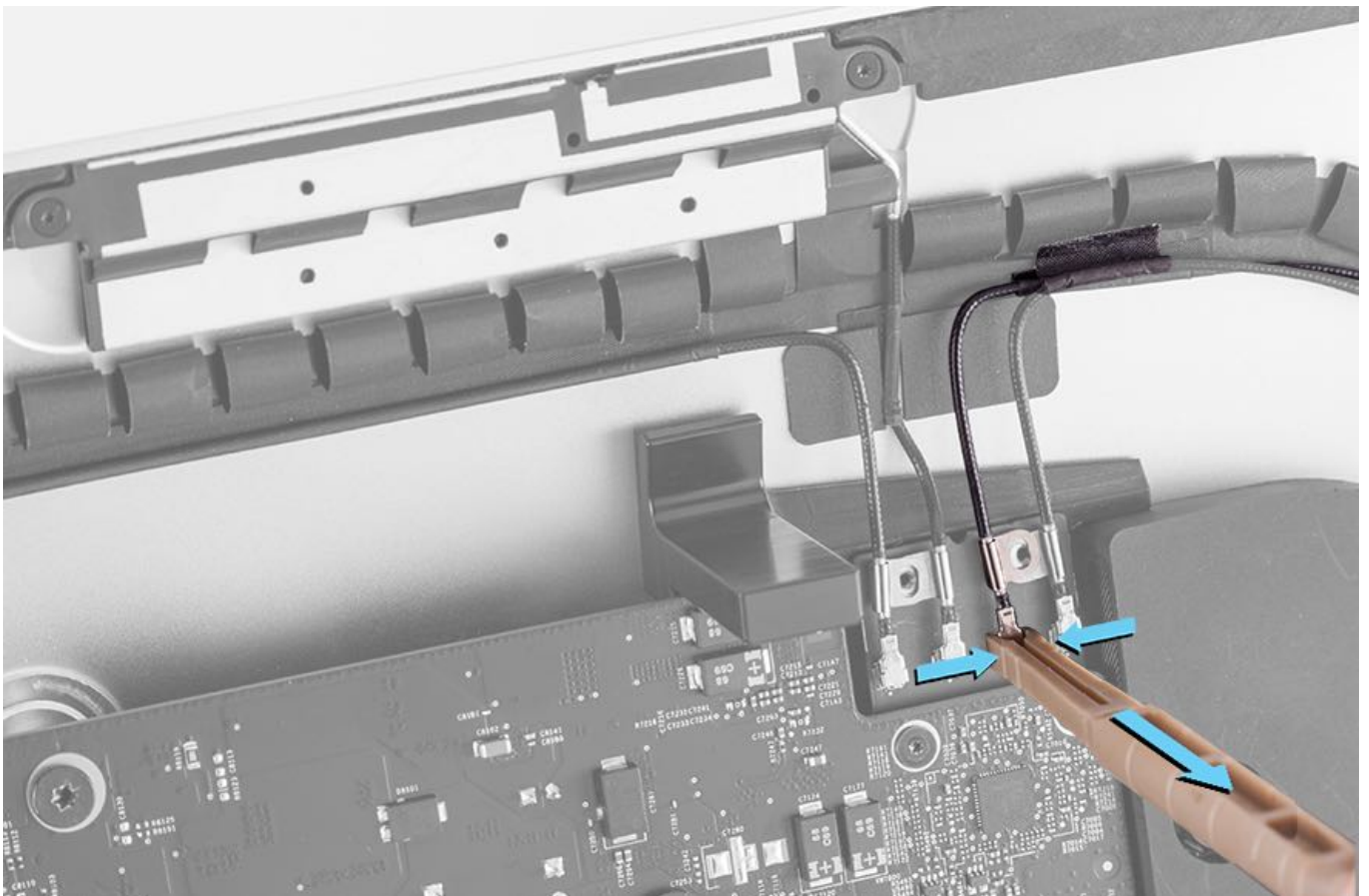




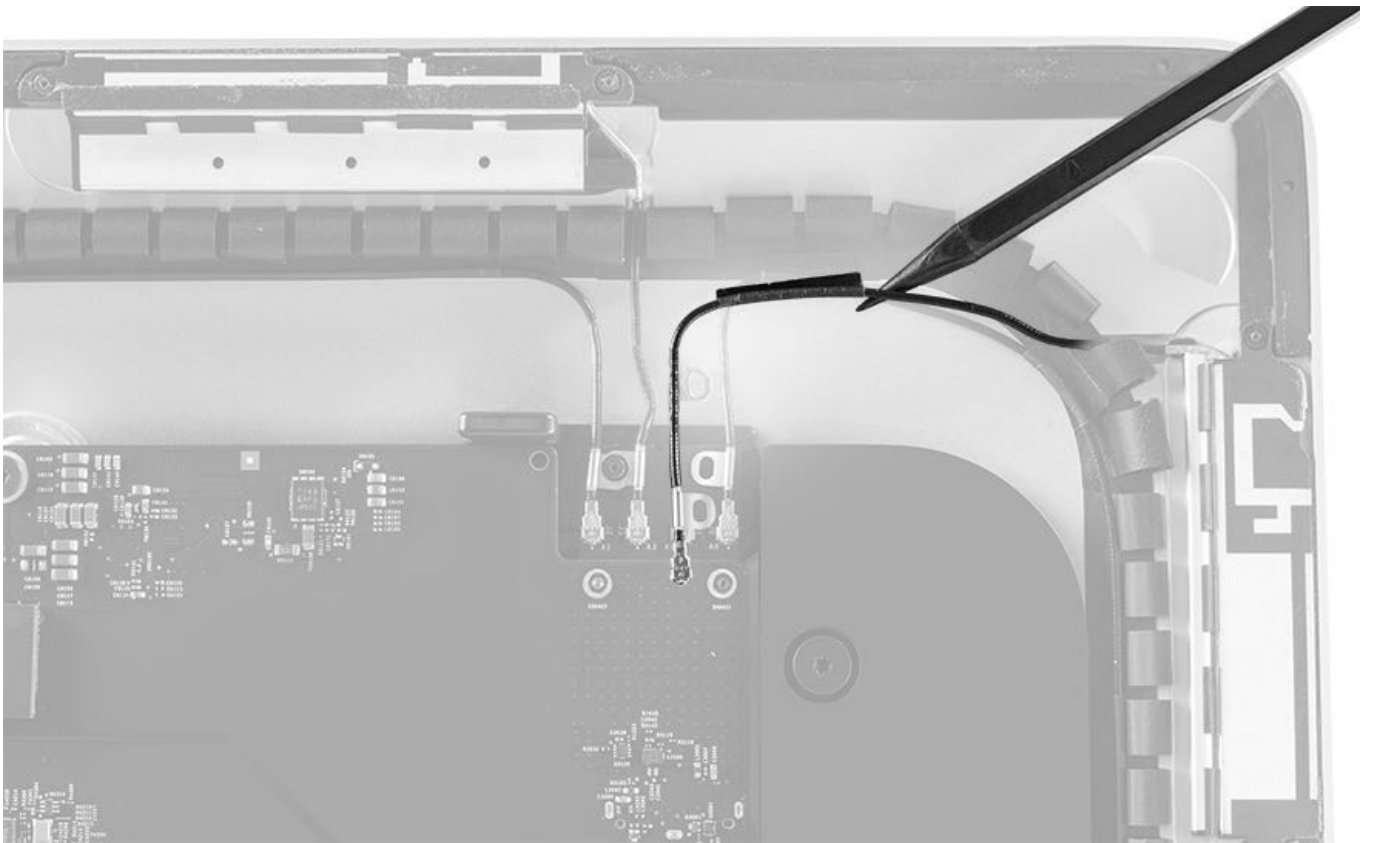


4. Use the antenna tool or ESD-safe tweezers to disconnect the connector from the wireless card.

**Note:** Avoid using a metal tool that could crimp or damage the cable.



5. Use a black stick to gently unroute the cable and its tape below the airloop gasket.



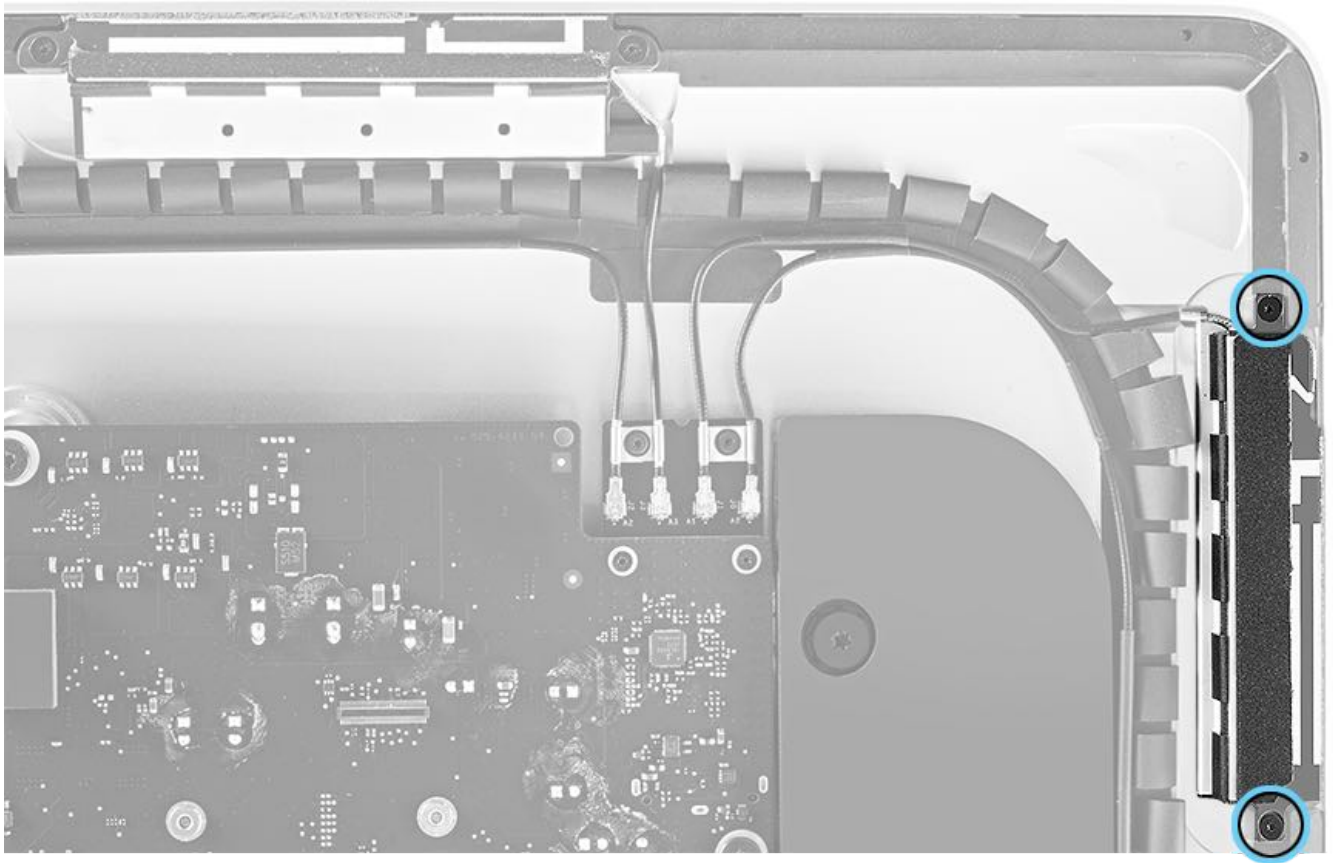
6. Remove the two T4 screws that secure the antenna body to the rear housing.

- T4: 923-00831



7. Remove the middle Wi-Fi antenna from the computer assembly.



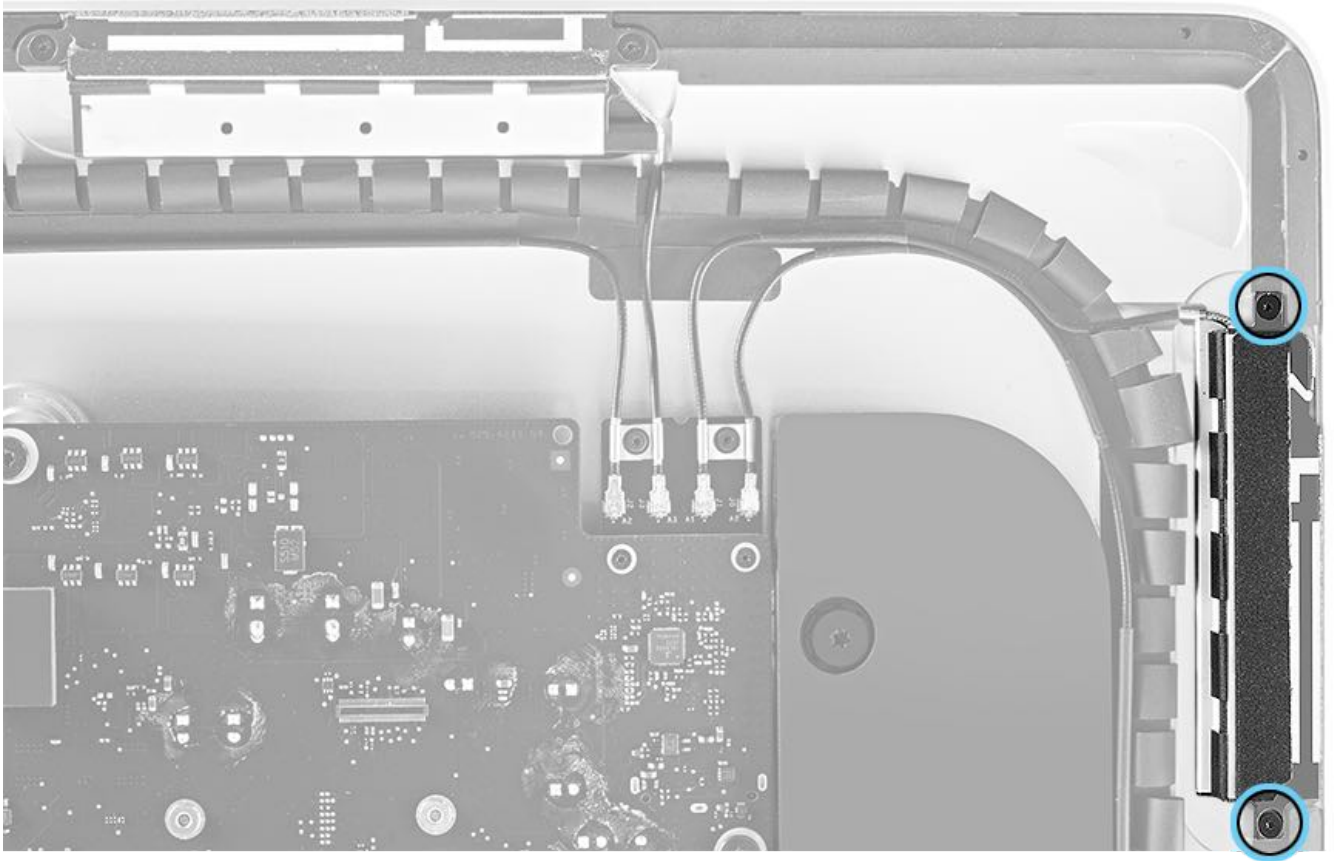


## Steps For Reassembly

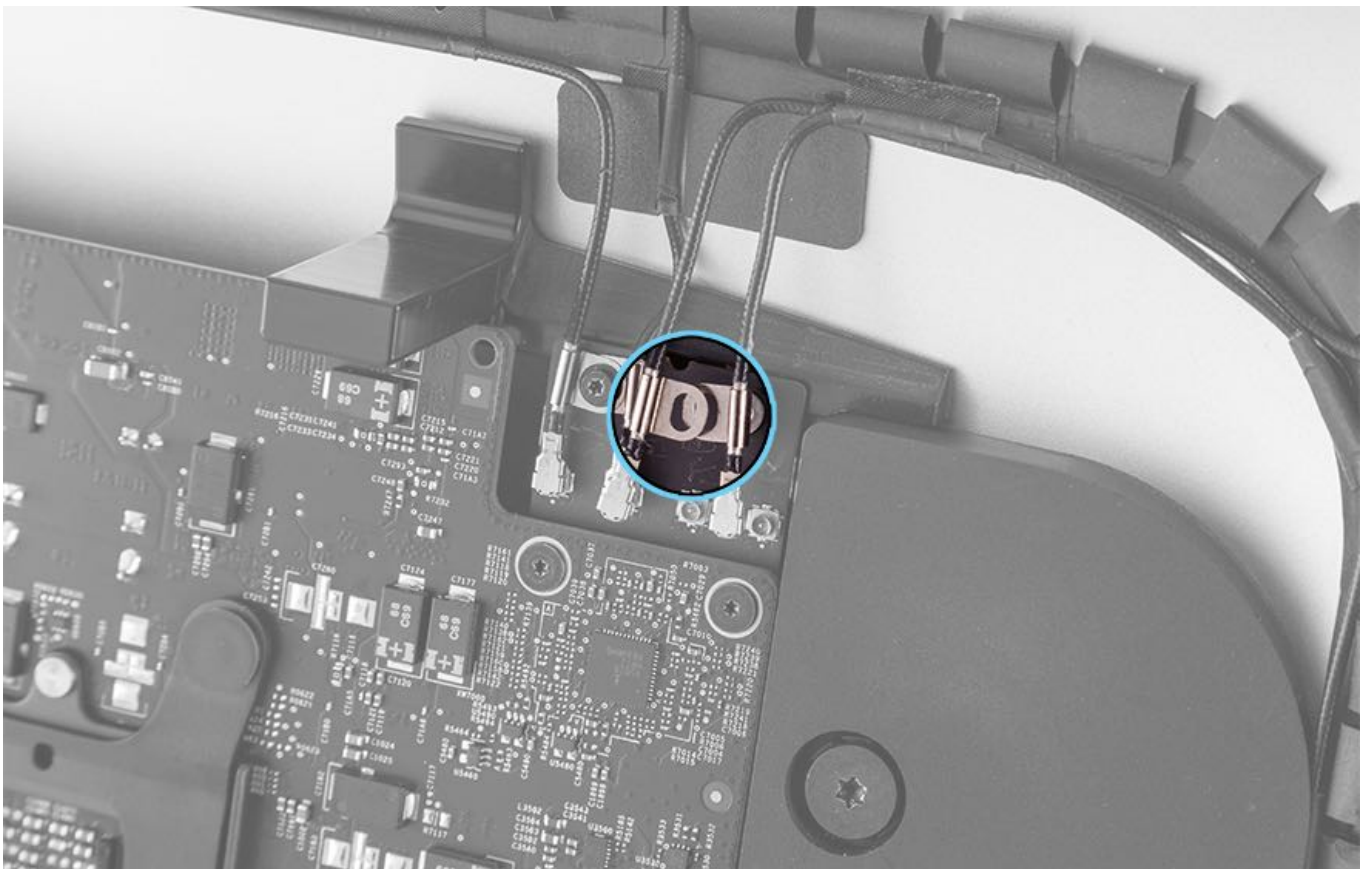
1. Install two T4 screws to secure the antenna body to the rear housing.

- T4: 923-00831

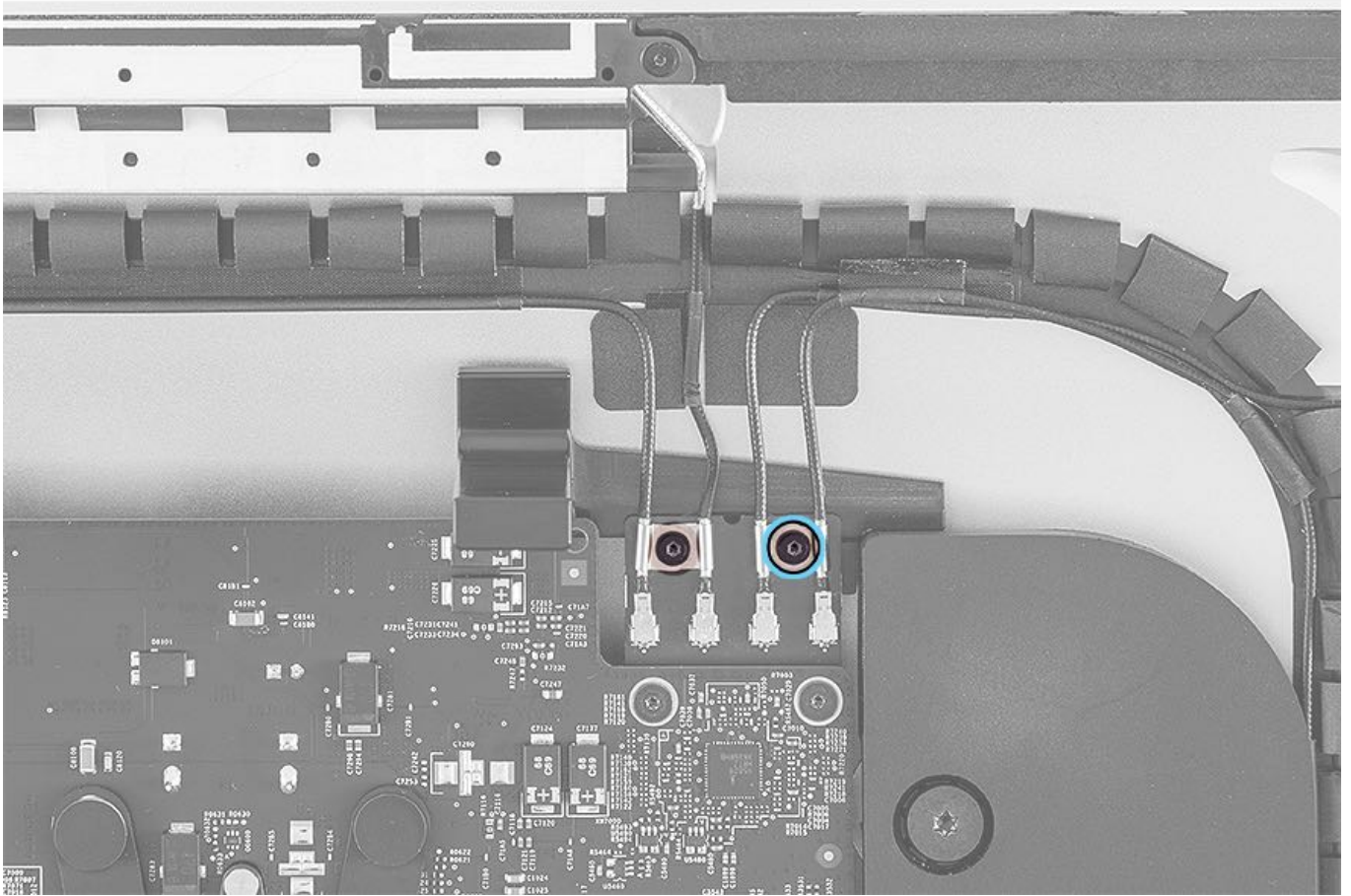




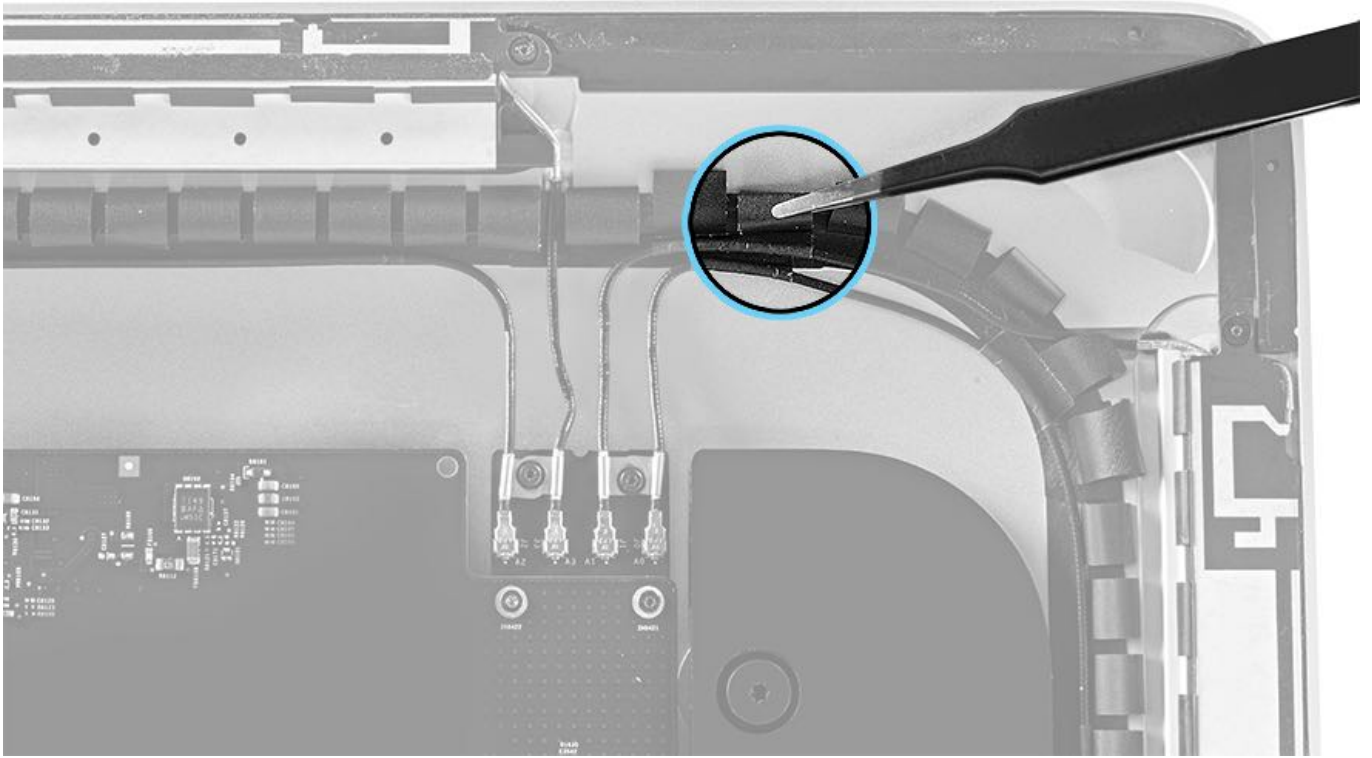
2. Route the antenna cable alongside the airloop gasket.
3. Tape the antenna cable to the rear housing. Make sure the tape lies flat.
4. Place the left bracket over the right bracket.



5. Install one T5 screw to the wireless antenna bracket.
  - T5: 923-00609, 3.8 mm



6. Use the antenna tool or ESD-safe tweezers to connect the cable to the wireless card.
7. Remove the wireless card support tool from the rear housing.
8. Use a black stick or tweezers to open any flattened loops along the airloop gasket.



9. Install new [display panel VHB strips](#).

10. Reinstall the [display panel](#).



# Lower Wi-Fi Antenna

## First Steps

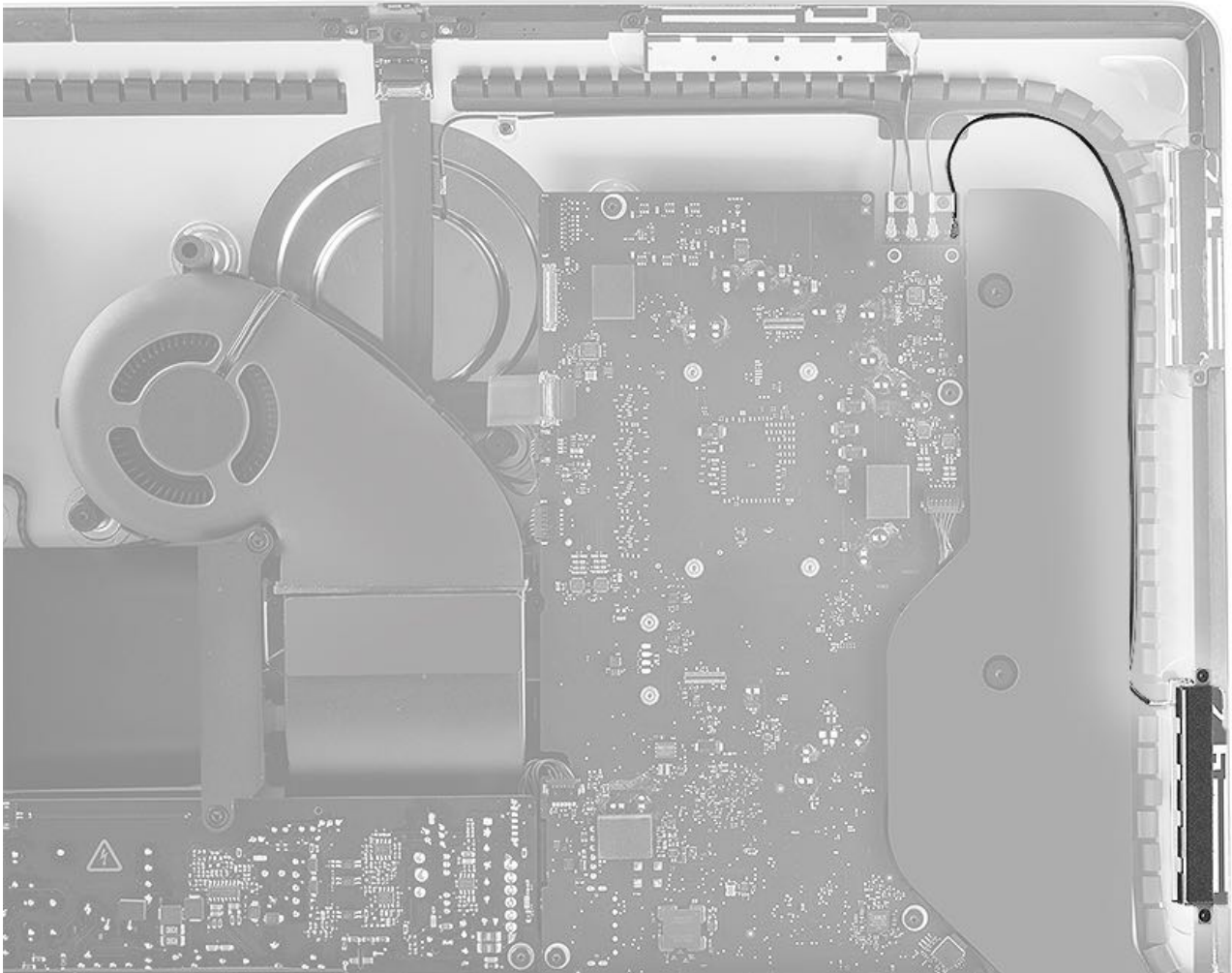
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV298: Bluetooth and Wi-Fi Antenna Replacement Video](#). (Late 2015 models only)

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

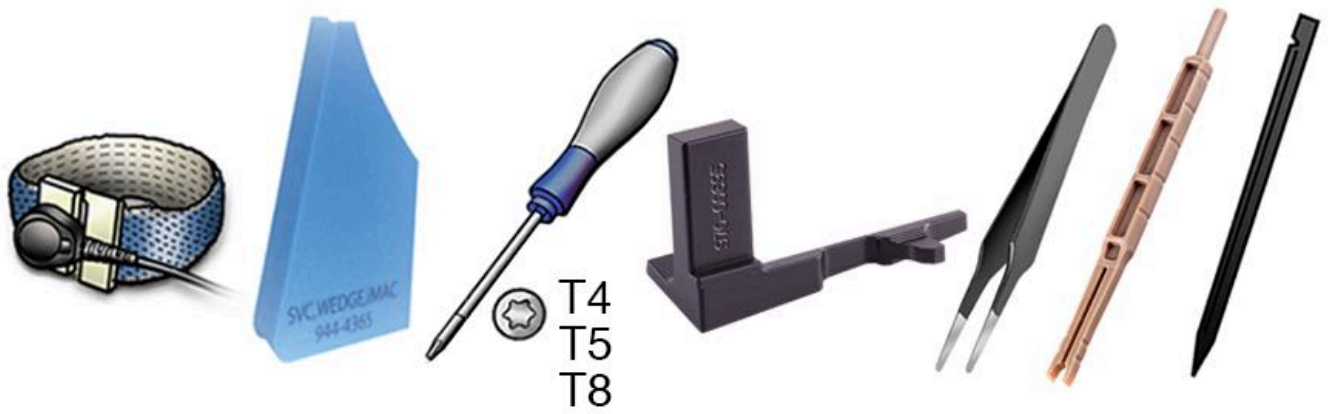
**Note:** Images of the iMac (21.5-inch, Late 2015) model are shown for this procedure.



## Tools

- ESD wrist strap and mat
- Service wedge (iMac)
- Torx T8 screwdriver (magnetized)
- Torx T5 screwdriver (magnetized)
- Torx T4 screwdriver (magnetized)
- Wireless card support tool (923-01806)
- ESD-safe tweezers or antenna tool (923-01322)
- Black stick



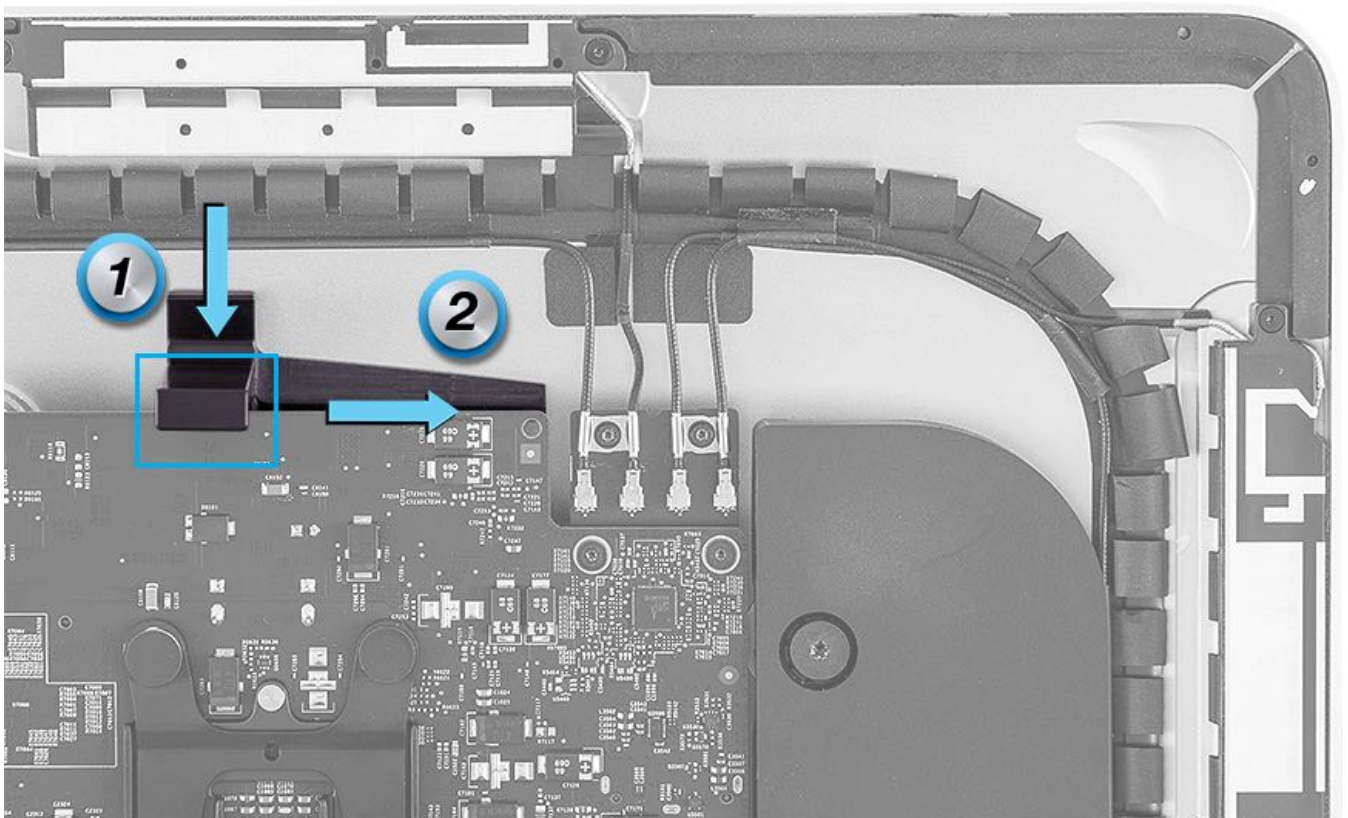


## Steps For Removal

**Important:** The iMac (21.5-inch, 2017) wireless support tool (923-01806) can be used when servicing both the iMac (Late 2015) and iMac (2017), but **do not** use the iMac (Late 2015) wireless support tool (923-00774) when servicing iMac (2017) models. The iMac (Late 2015) tool could damage components on the back side of the iMac (2017) logic board.

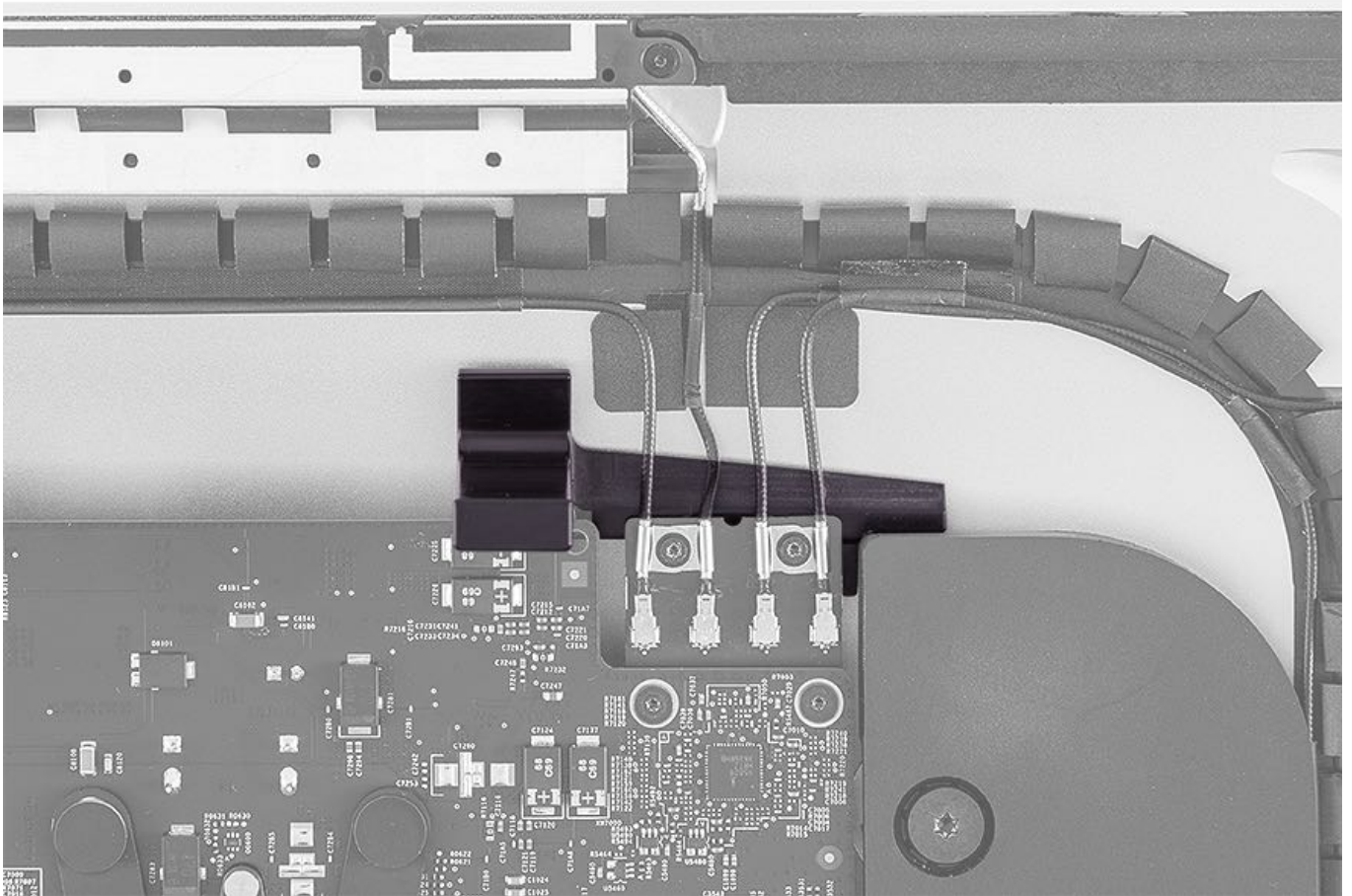
iMac (2017) wireless support tool (923-01806)	iMac (Late 2015) wireless support tool (923-00774)

1. Holding the tool by the handle (item in the square), lower the tool (1) so it rests on the edge of the logic board, then slide the tool to the right (2) behind the wireless card (see step 2).



2. This image shows the wireless card support tool installed correctly.

**Note:** Keep the wireless support tool in position while removing or replacing screws and disconnecting or reconnecting antenna cables.

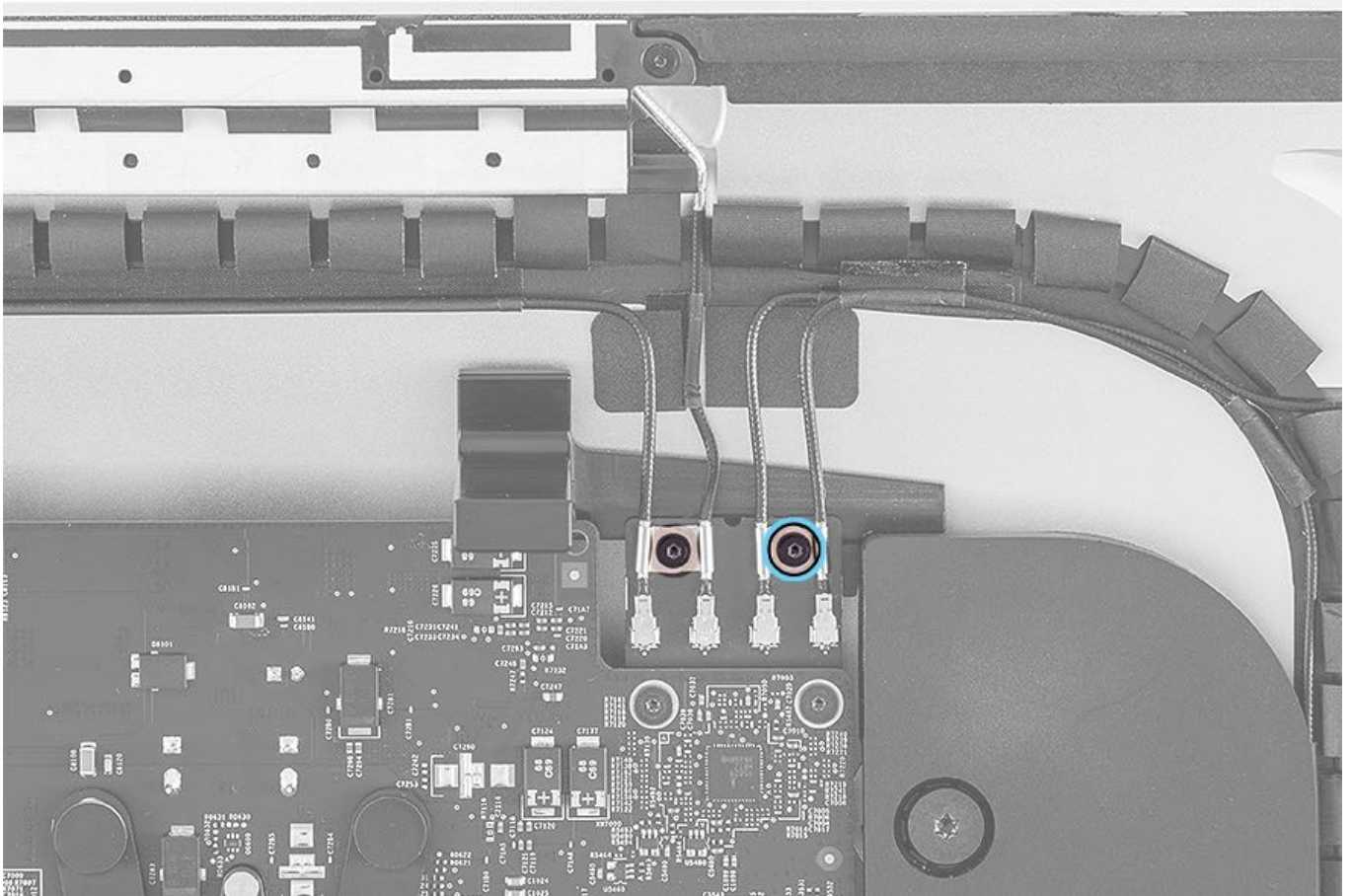


3. Remove one T5 screw from the wireless antenna bracket.

- T5: 923-00609, 3.8 mm

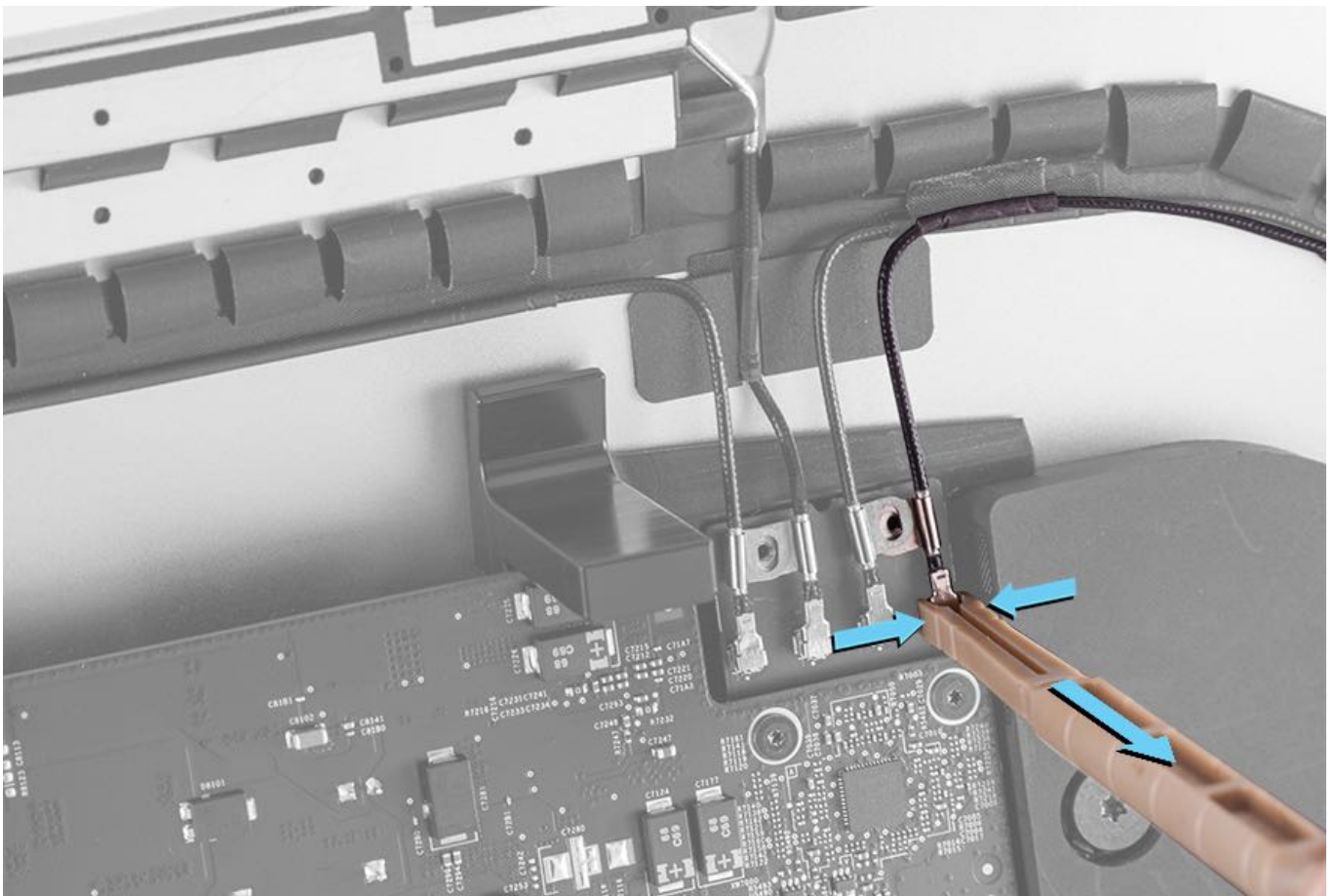




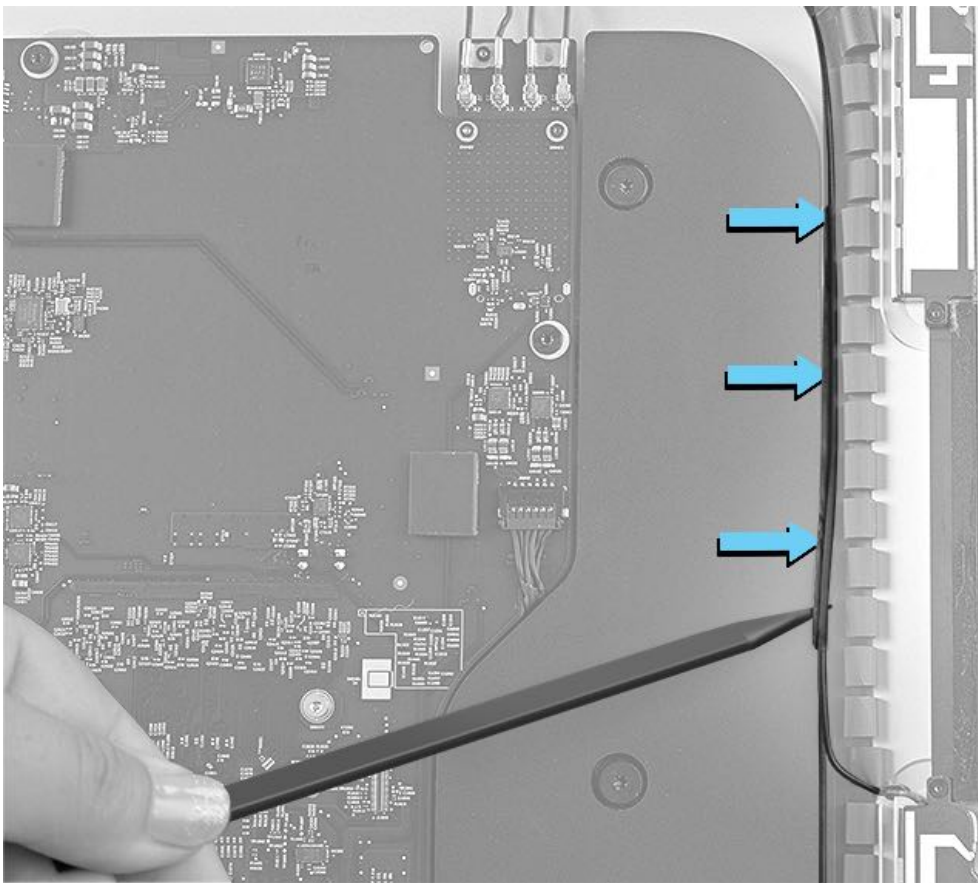


4. Use the antenna tool or ESD-safe tweezers to disconnect the connector from the wireless card.

**Note:** Avoid using a metal tool that could crimp or damage the cable.



5. Use a black stick to gently lift the cable and its tape from the speaker channel.

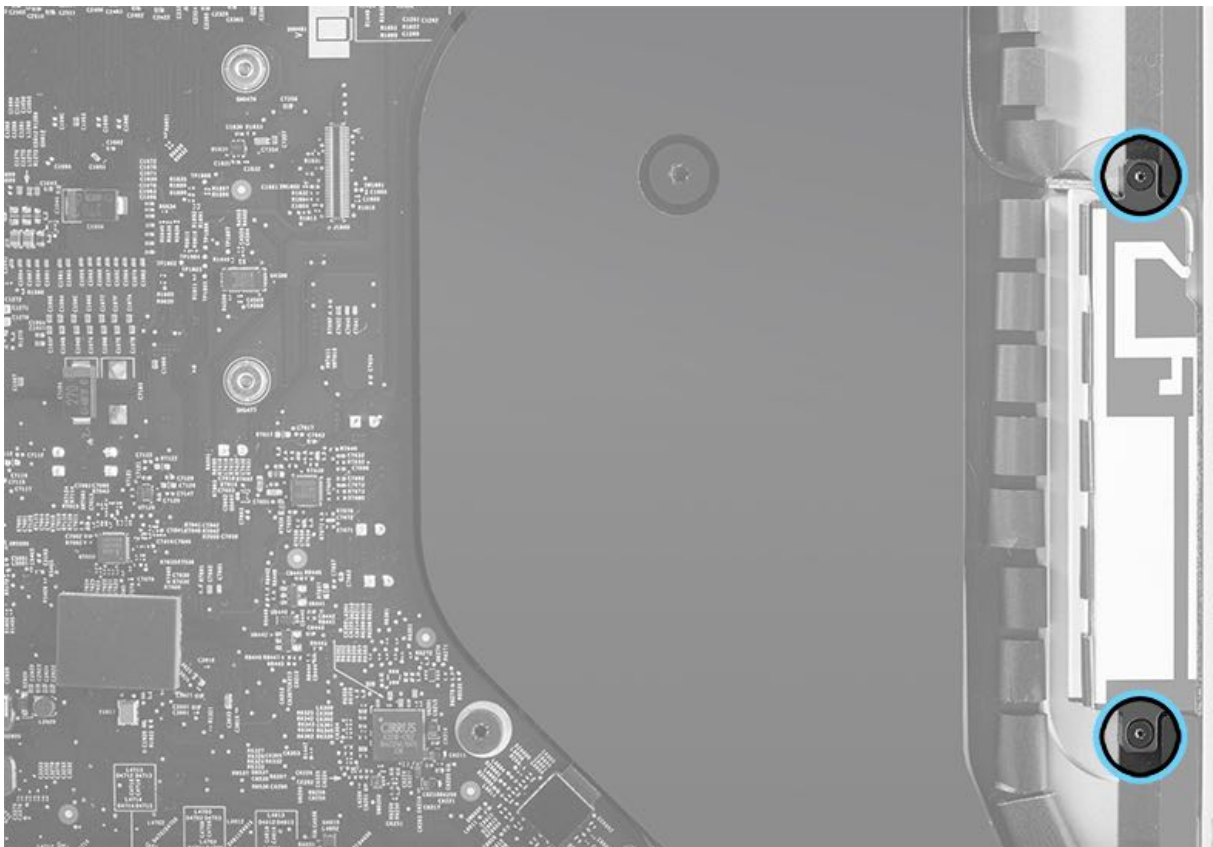


6. Remove the two T4 screws that secure the antenna body to the rear housing.

- T4: 923-00831



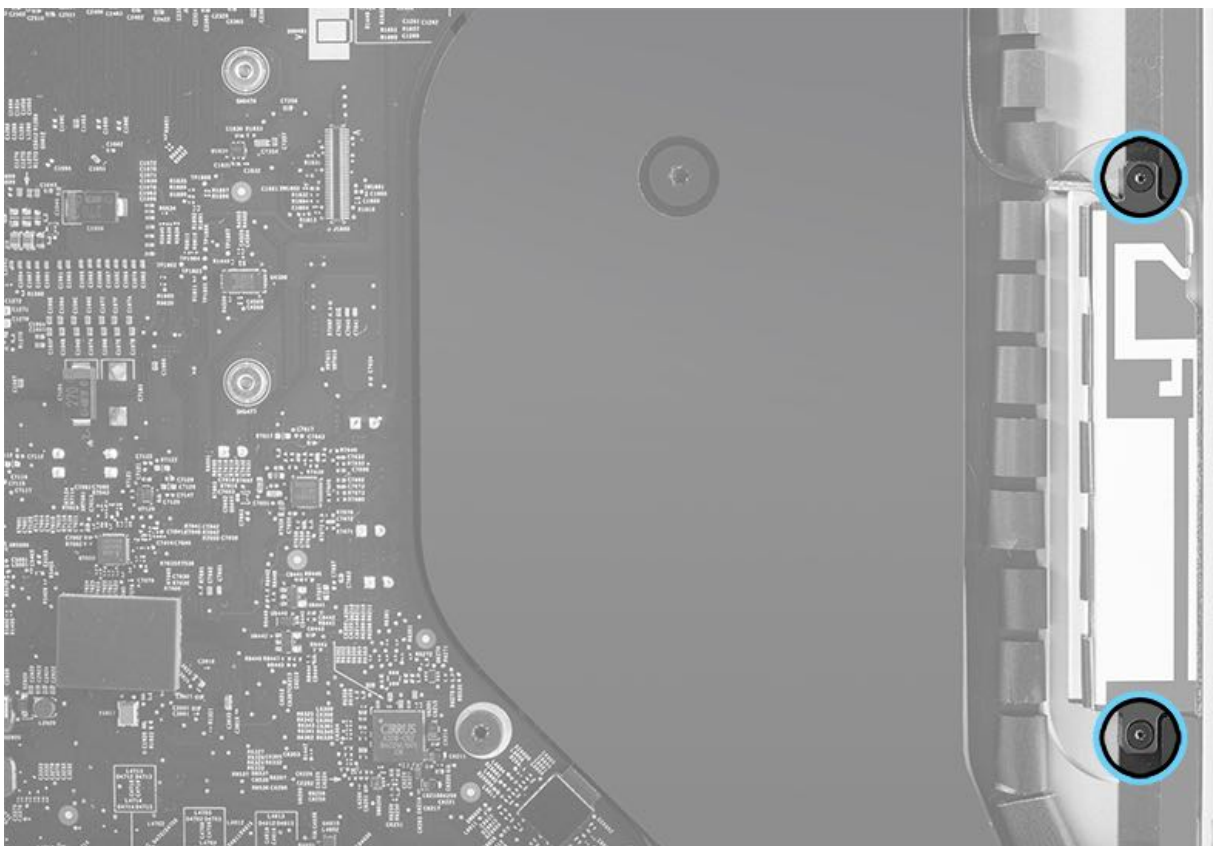
7. Remove the lower Wi-Fi antenna from the computer assembly.



## Steps For Reassembly

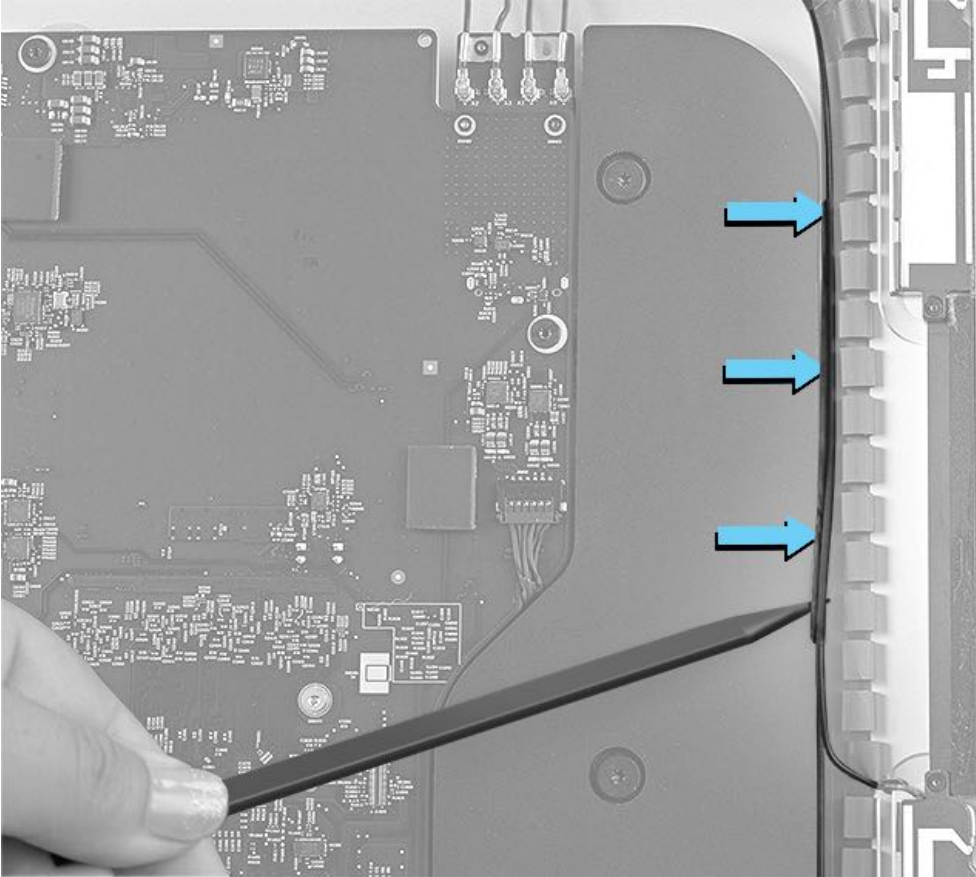
1. Install two T4 screws to secure the antenna body to the rear housing.

- T4: 923-00831



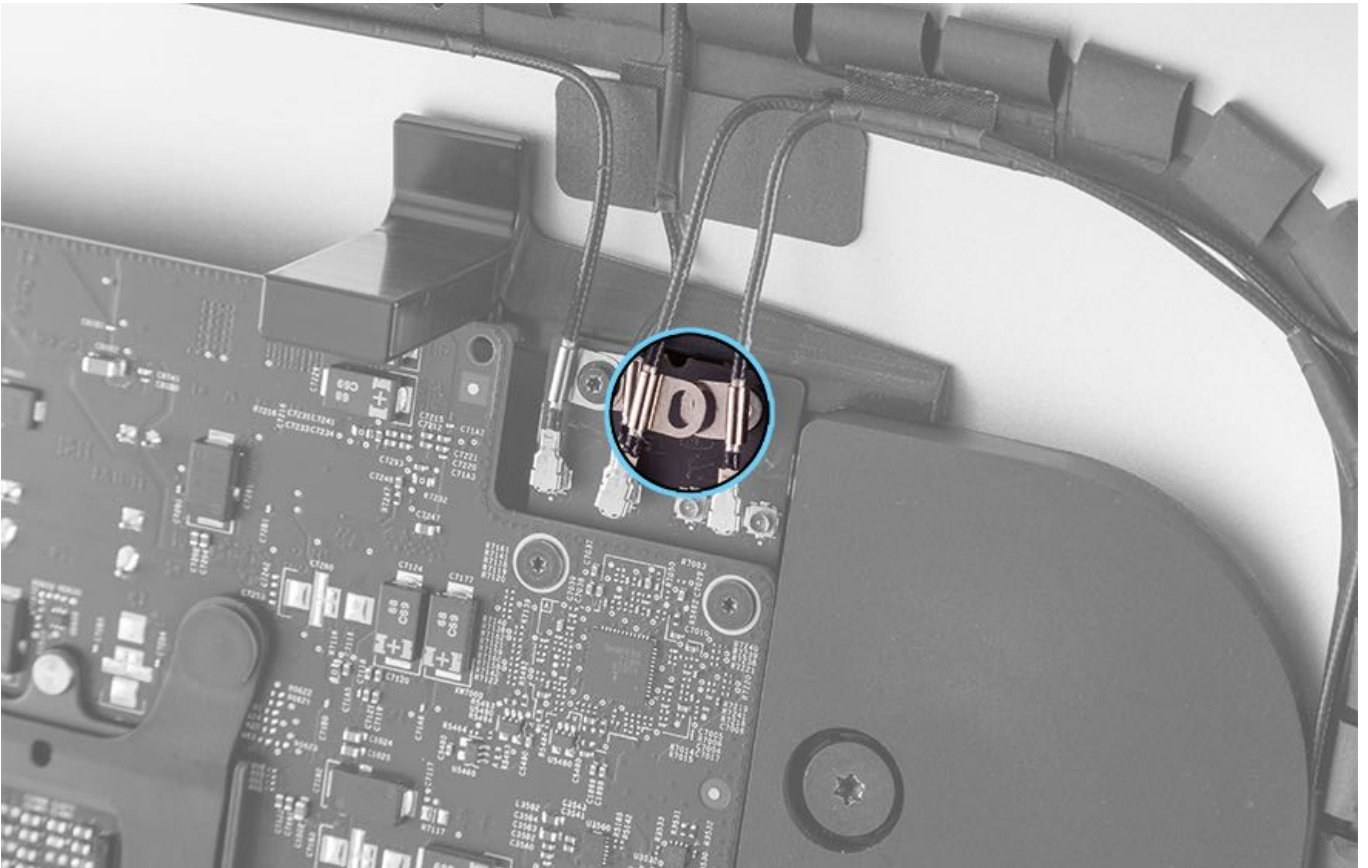


2. Route the antenna cable into the speaker channel.



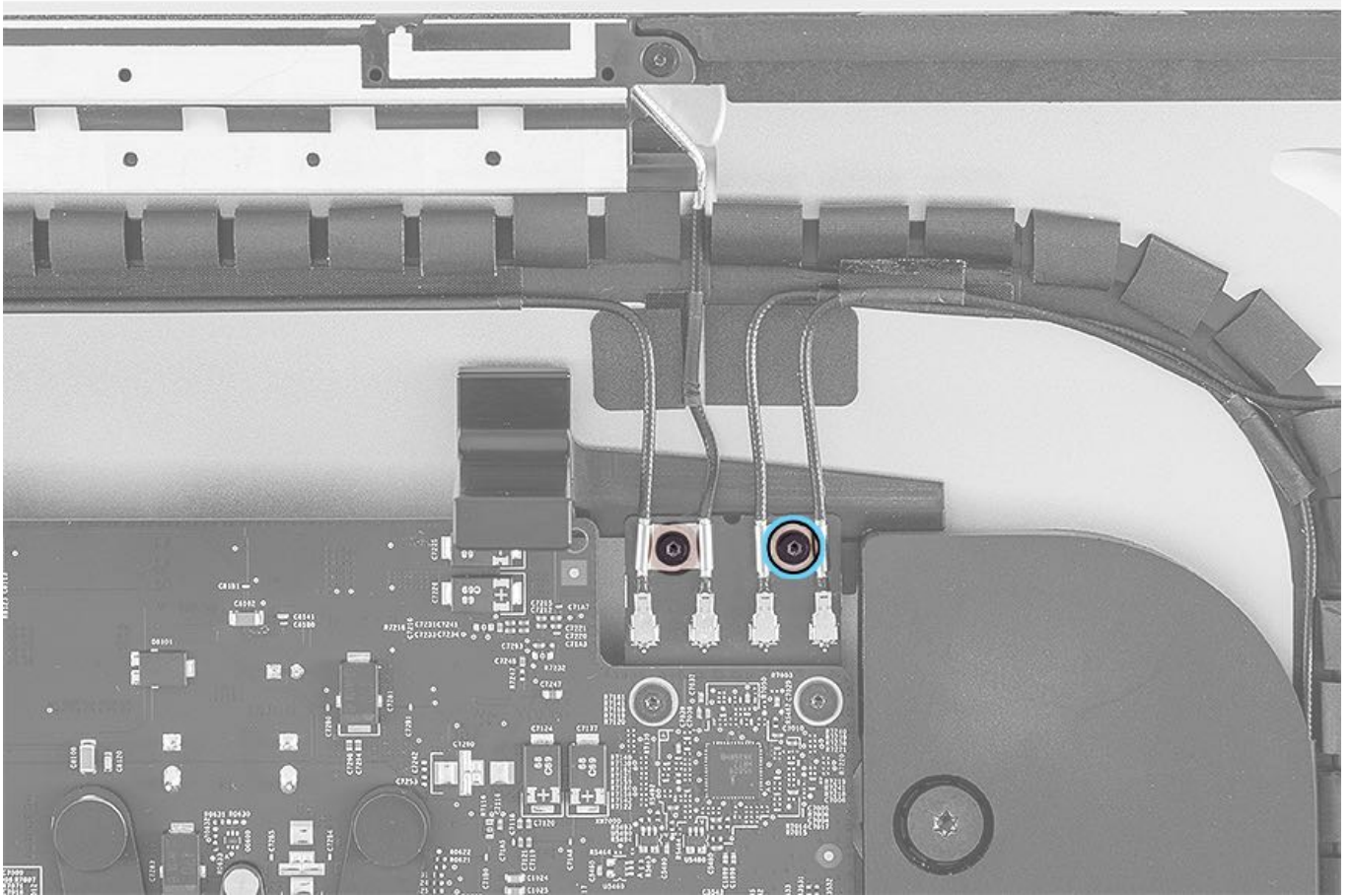
3. Tape the antenna cable to the rear housing. Make sure the tape lies flat.

4. Slide the right bracket under the left bracket.

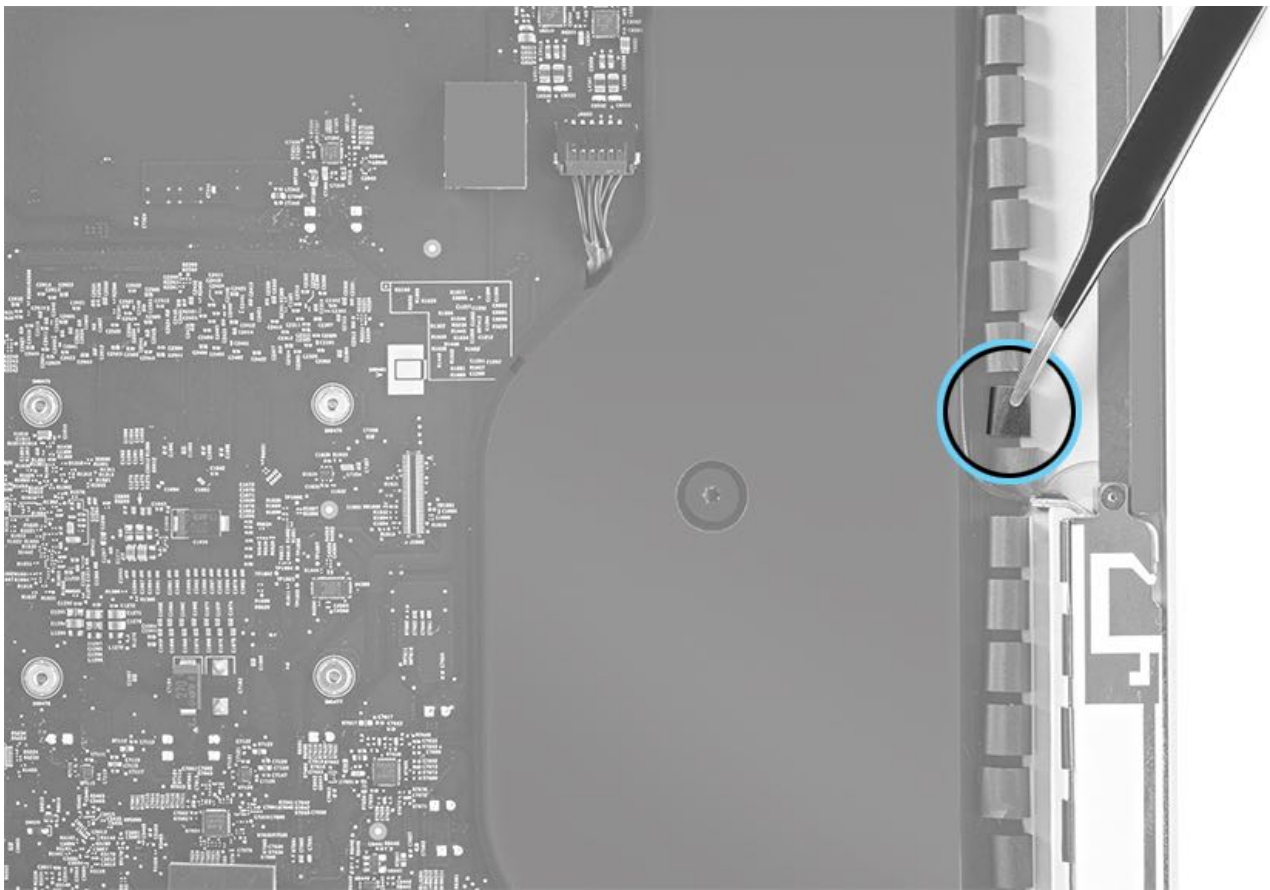


5. Install one T5 screw to the wireless antenna bracket.

- T5: 923-00609, 3.8 mm



6. Use the antenna tool or ESD-safe tweezers to connect the cable to the wireless card.
7. Remove the wireless card support tool from the rear housing.
8. Use a black stick or tweezers to open any flattened loops along the airloop gasket.



9. Install new [display panel VHB strips](#).

10. Reinstall the [display panel](#).

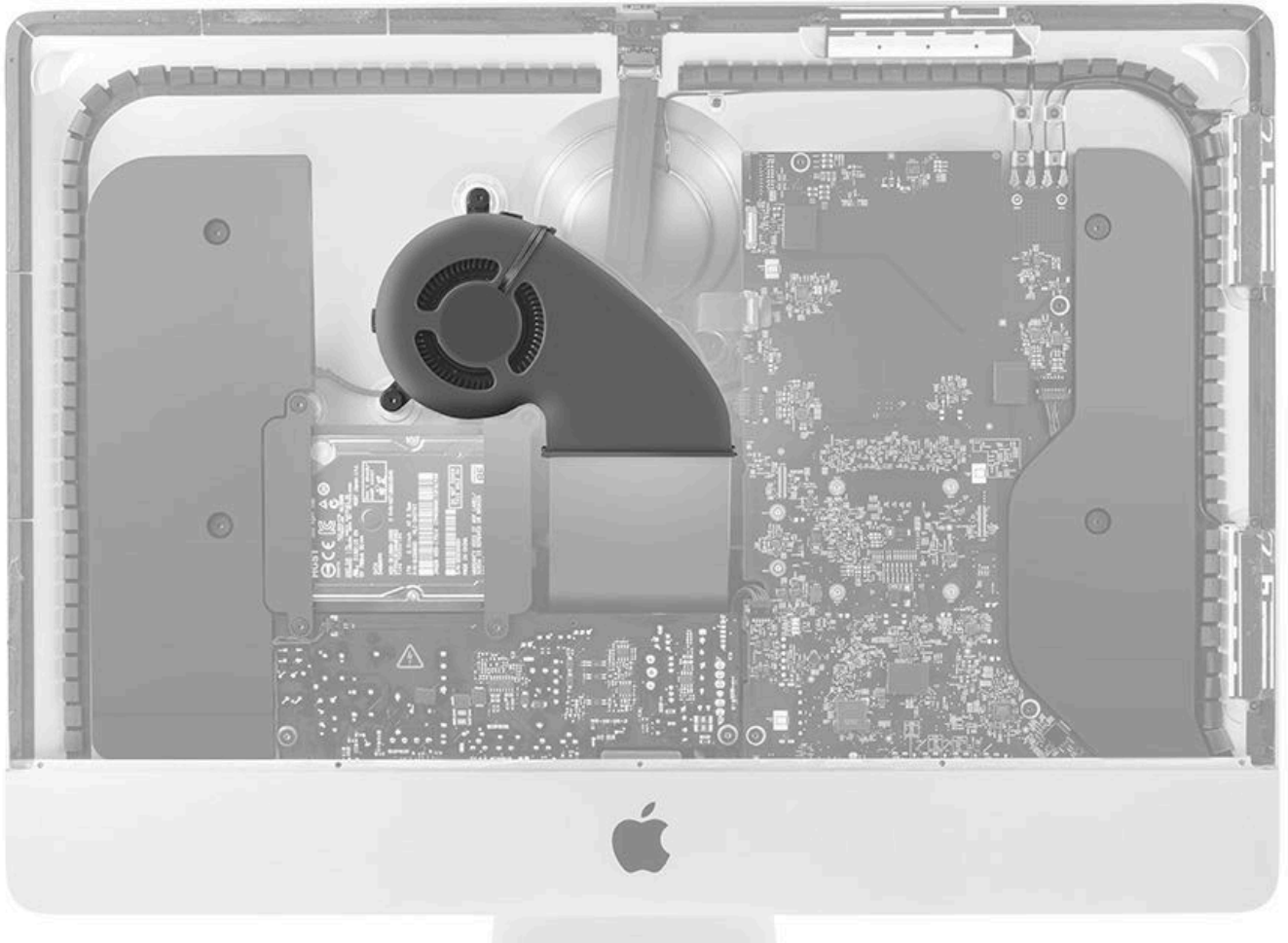
# Fan

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)



## Tools

- ESD wrist strap and mat
- Torx T10 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)



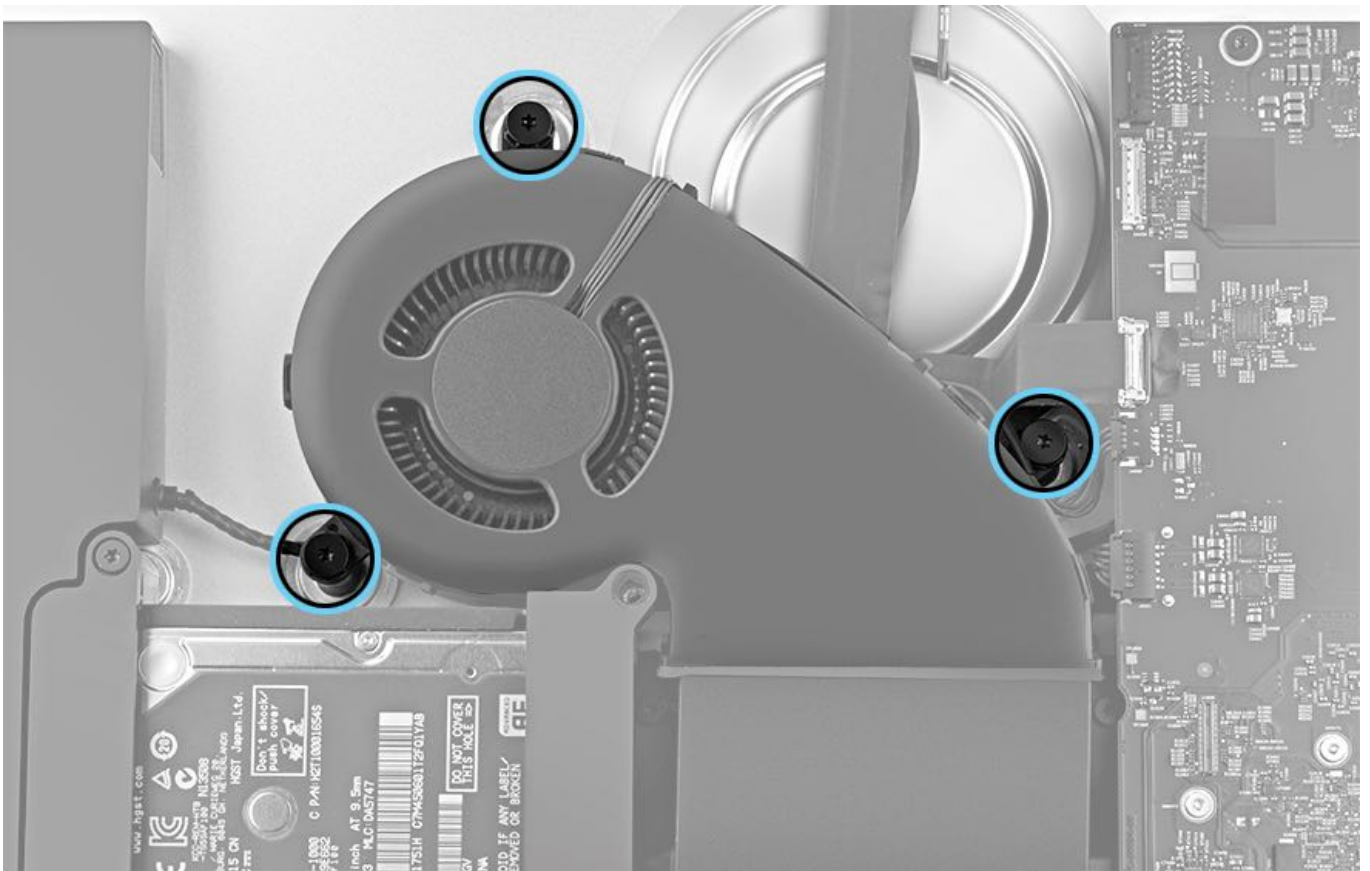




## Steps For Removal

1. Remove three T10 screws from the fan.

- T10: 923-0333, 13 mm



2. Use a black stick to disconnect the fan cable from the logic board.





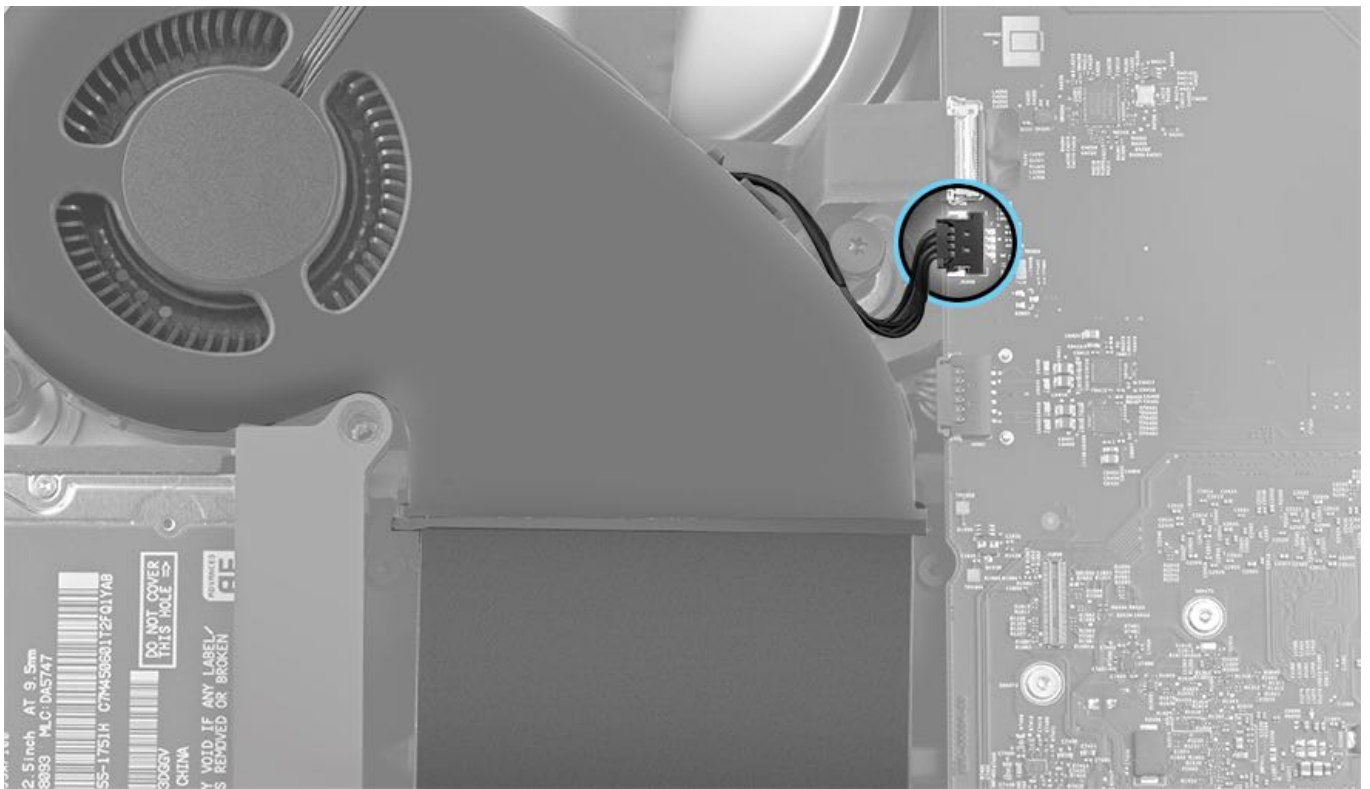
## Steps For Reassembly

1. Install three T10 screws to the fan.

- T10: 923-0333, 13 mm



2. Connect the fan cable to the logic board. Verify that the cable is routed correctly.



3. Install new [display panel VHB strips](#).
4. Reinstall the [display panel](#).

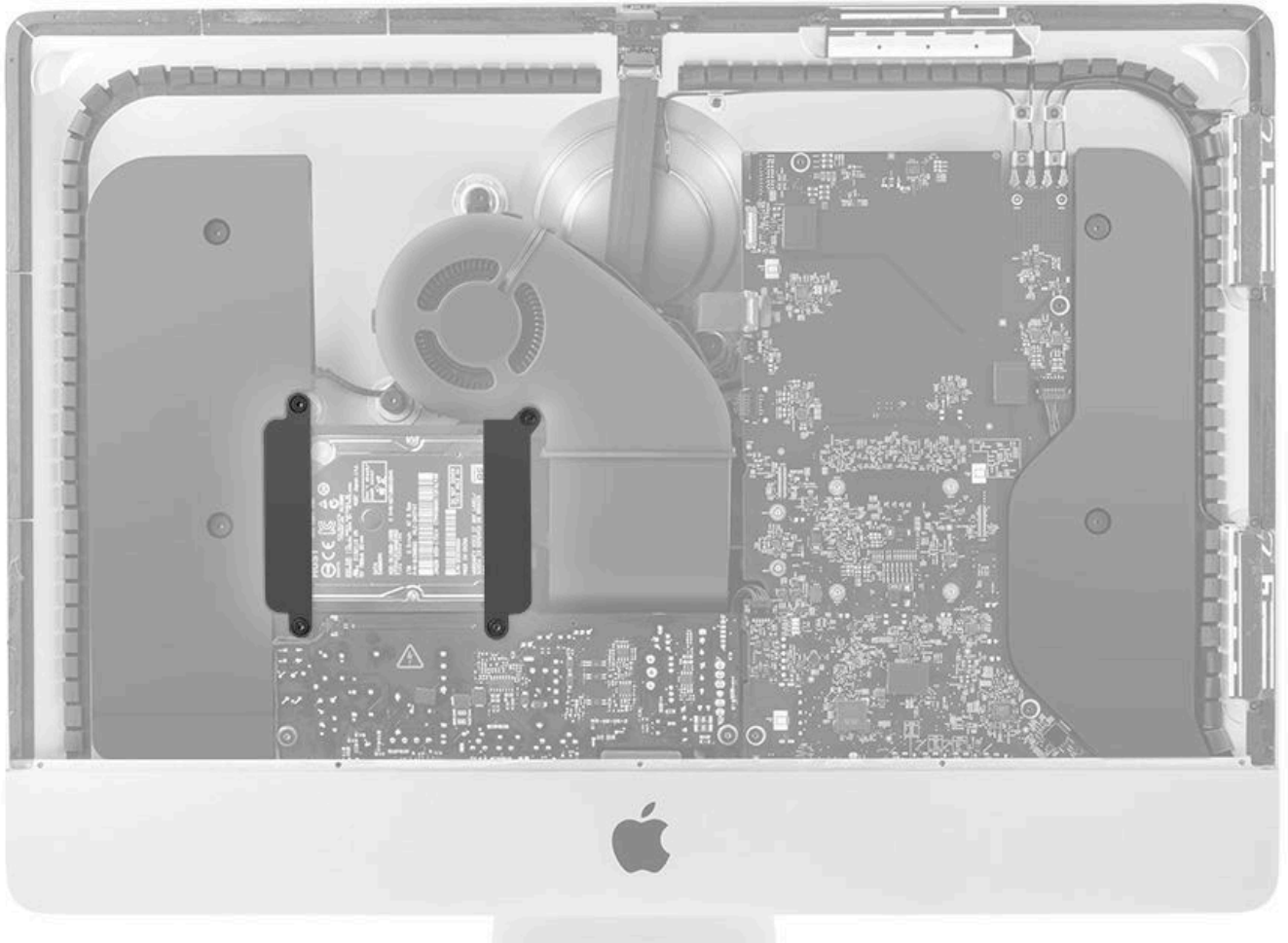
# Hard Drive Brackets

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)



## Tools

- ESD wrist strap and mat
- Torx T10 screwdriver
- Service wedge (iMac)

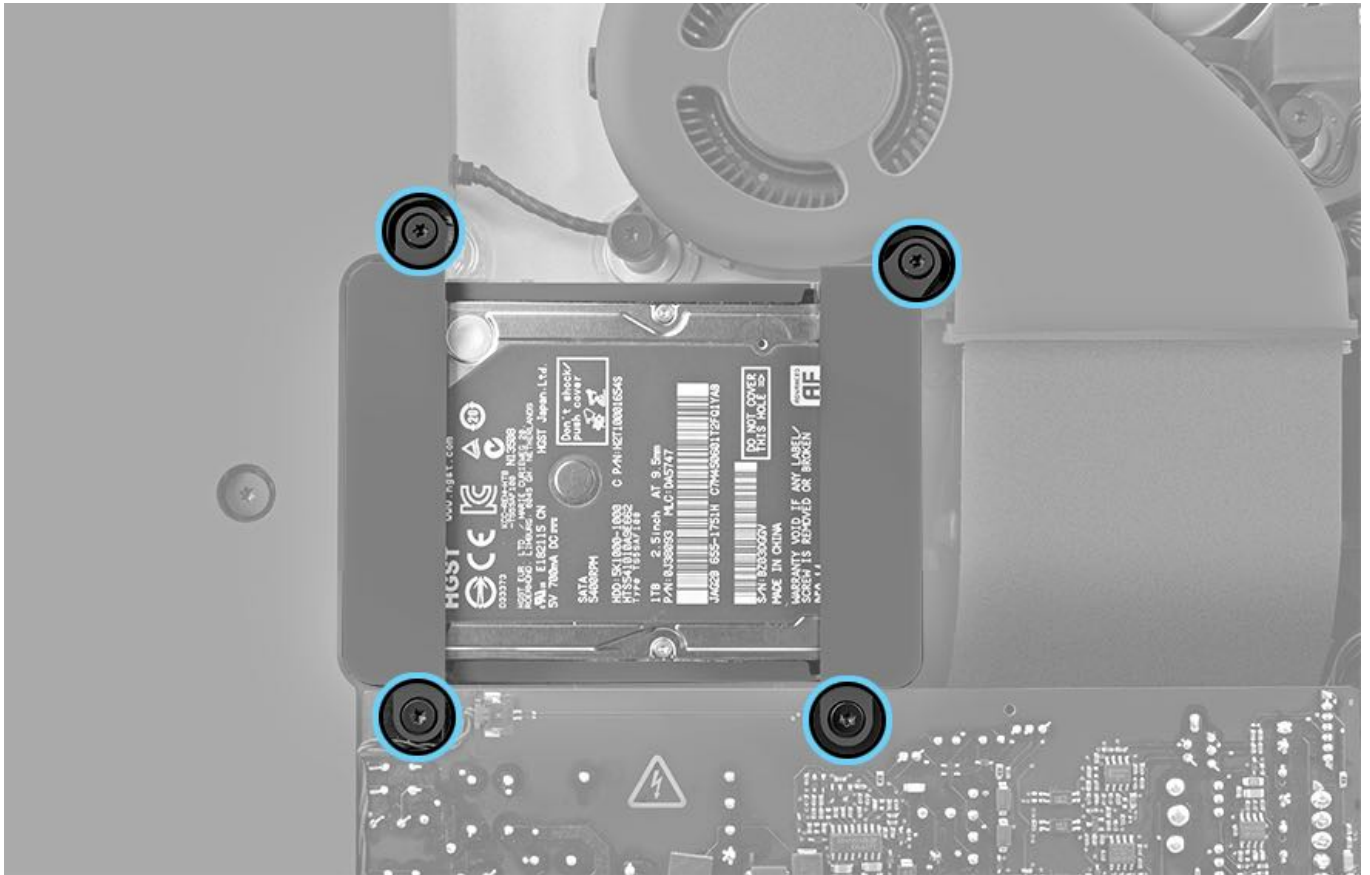


## Steps For Removal

**Caution:** Ensure that data is backed up before removing the hard drive.

1. Remove four T10 screws from the hard drive brackets:

- T10: 923-0324, 21 mm, two at left
- T10: 923-0323, 9 mm, one at upper right
- T10: 923-0325, 27 mm, one at lower right



2. Remove the hard drive brackets. The image below shows the brackets removed and the bumpers remaining.

**Note:** When replacing the brackets, be sure that none of the hard drive bumpers are pinched between the hard drive and the brackets.



## Steps For Reassembly

1. The hard drive brackets will only install one way. Be sure to orient them correctly.

## Left Bracket



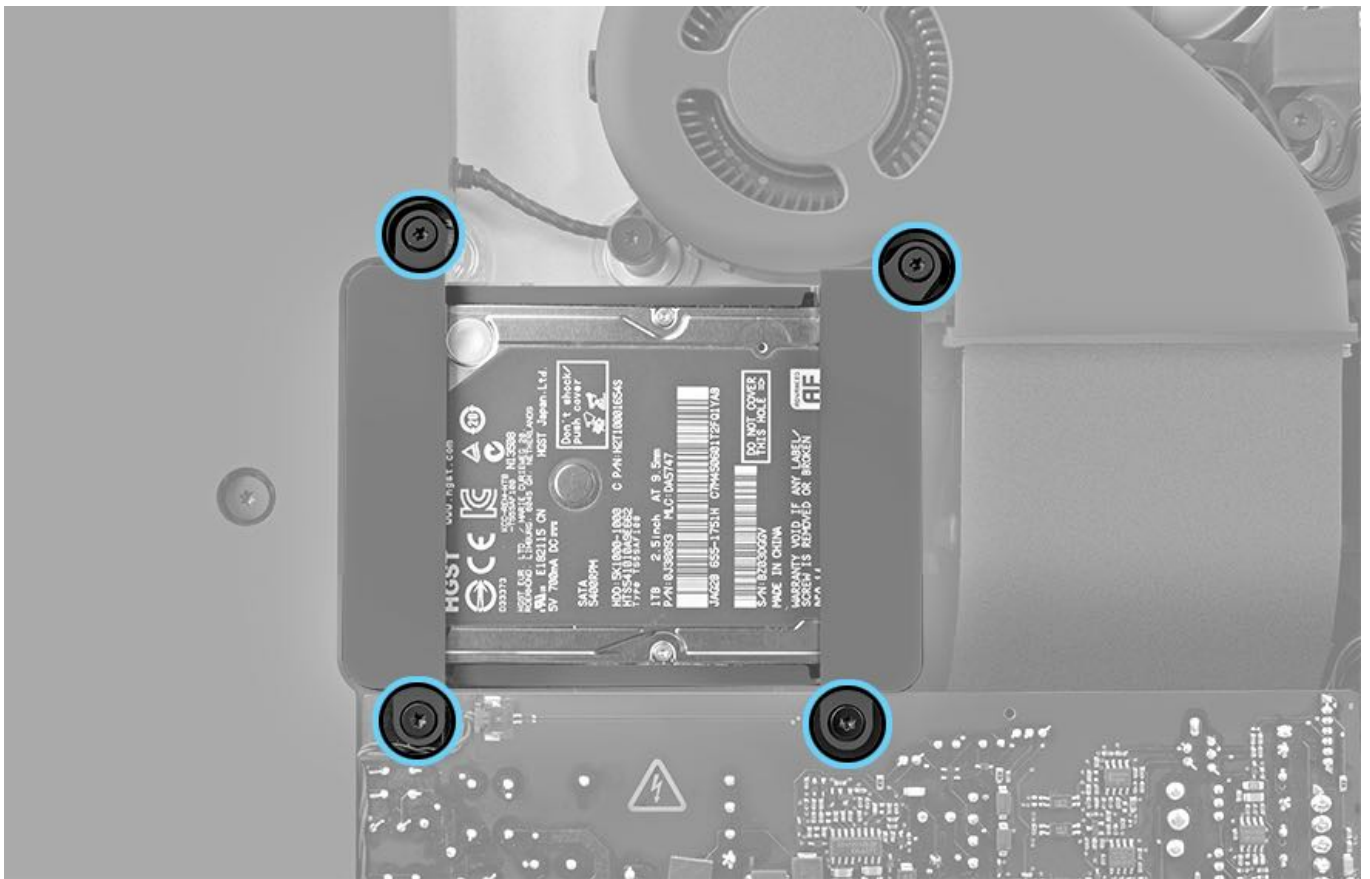
### Right Bracket



2. Install four T10 screws into the hard drive brackets:

- T10: 923-0324, 21 mm, two at left
- T10: 923-0323, 9 mm, one at upper right
- T10: 923-0325, 27 mm, one at lower right





3. Install new [display panel VHB strips](#).

4. Reinstall the [display panel](#).

# Hard Drive

## First Steps

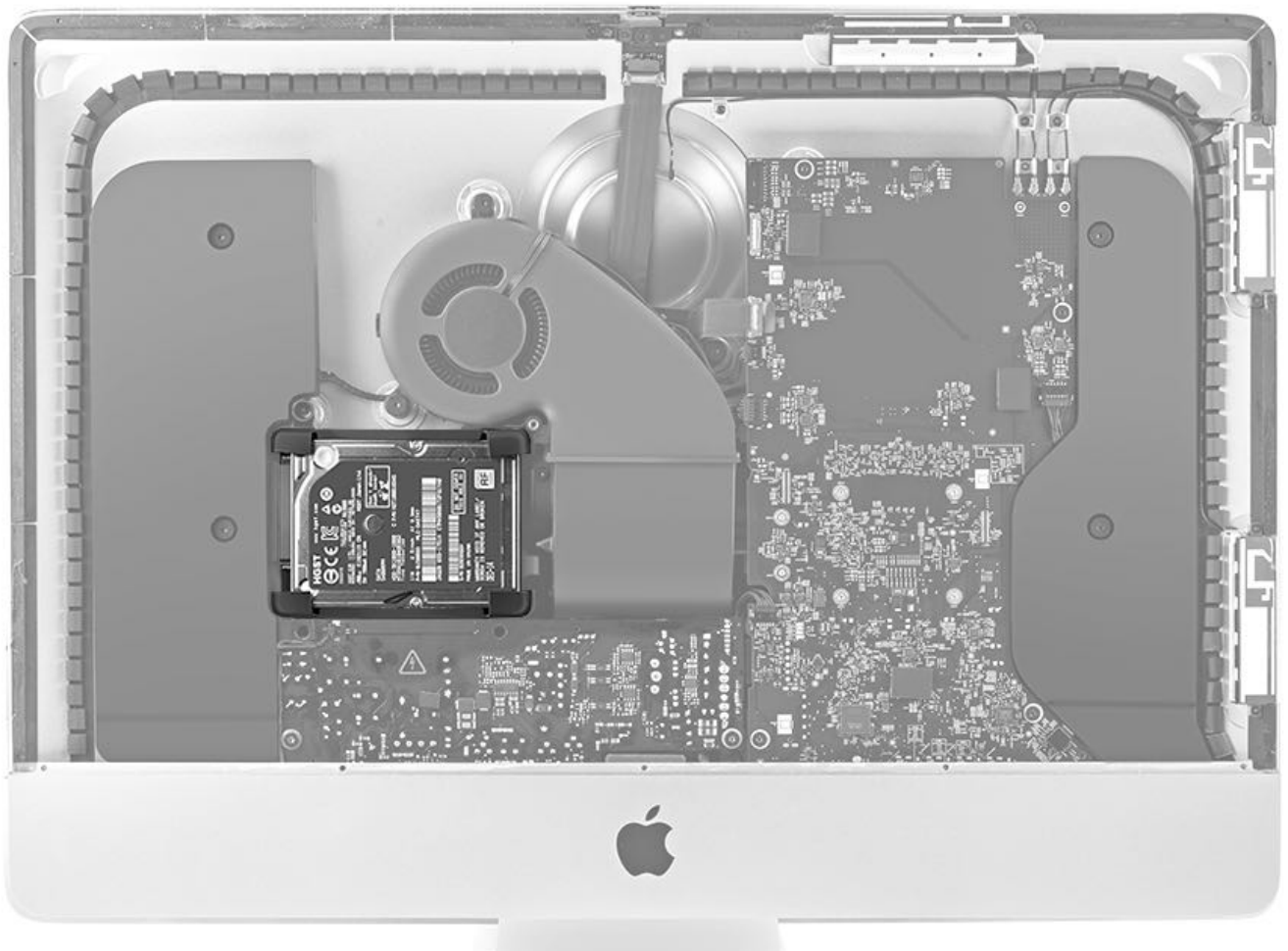
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

**Caution:** Ensure that data is backed up before removing the hard drive.

For video instruction, refer to article [SV236: Hard Drive Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Hard drive brackets](#)



## Tools

- ESD wrist strap and mat
- Service wedge (iMac)



## Steps For Removal

1. Disconnect one combo cable (hard drive power and hard drive data) from the hard drive. Use a black stick to remove the cable.

**Note:** Loosen the left speaker screws and move the speaker for easier access the hard drive combo cable connector.



## Steps For Reassembly

1. Plug the hard drive combo cable into the hard drive.

**Note:** If the left speaker was moved out of the way, move it back and tighten the two speaker screws.



2. The hard drive brackets install only one way. Be sure to orient them correctly.

**Note:** When reinstalling the hard drive brackets, be sure that none of the hard drive bumpers are pinched between the brackets and the hard drive.

**Left Bracket**



**Right Bracket**



3. Reinstall the [hard drive brackets](#).

4. Install new [display panel VHB strips](#).

5. Reinstall the [display panel](#).

6. See article [TP767: Reinstalling Software That Came with the Computer](#).

# Reinstalling Software That Came with the Computer

## Reinstalling Software That Came with the Computer

This procedure requires an Internet connection.

**Note:** In some situations, a user may have set a firmware password via a feature such as Find My Mac or FileVault. The user must know the firmware password in order to reinstall OS X or macOS. If the user cannot remember the password, then refer to the technician instructions in article [HT203409: If you lost or forgot your firmware password](#).

**Important:** Apple recommends that users back up their data before any software restore procedure. Back up essential files before installing OS X or macOS. Apple is not responsible for any loss of data.

1. Choose Apple menu > Restart, then hold down the Command (⌘) and R keys while the computer restarts.  
**Note:** To force OS X Lion or later, or macOS Sierra, into Internet Recovery, press and hold the Command-Option-R key combination while starting up the computer.
2. If the computer is not connected to the Internet, choose a network from the Wi-Fi menu (in the top-right corner of the screen).
3. Select "Reinstall OS X" (or macOS), then click Continue.
4. Follow the onscreen instructions. In the pane where you select a disk, select your current OS X or macOS disk (in most cases, it is the only one available).
5. To start the installation, click Install.

Check for and apply the latest software and firmware updates.

For more information, refer to article [HT201314: About macOS Recovery](#).



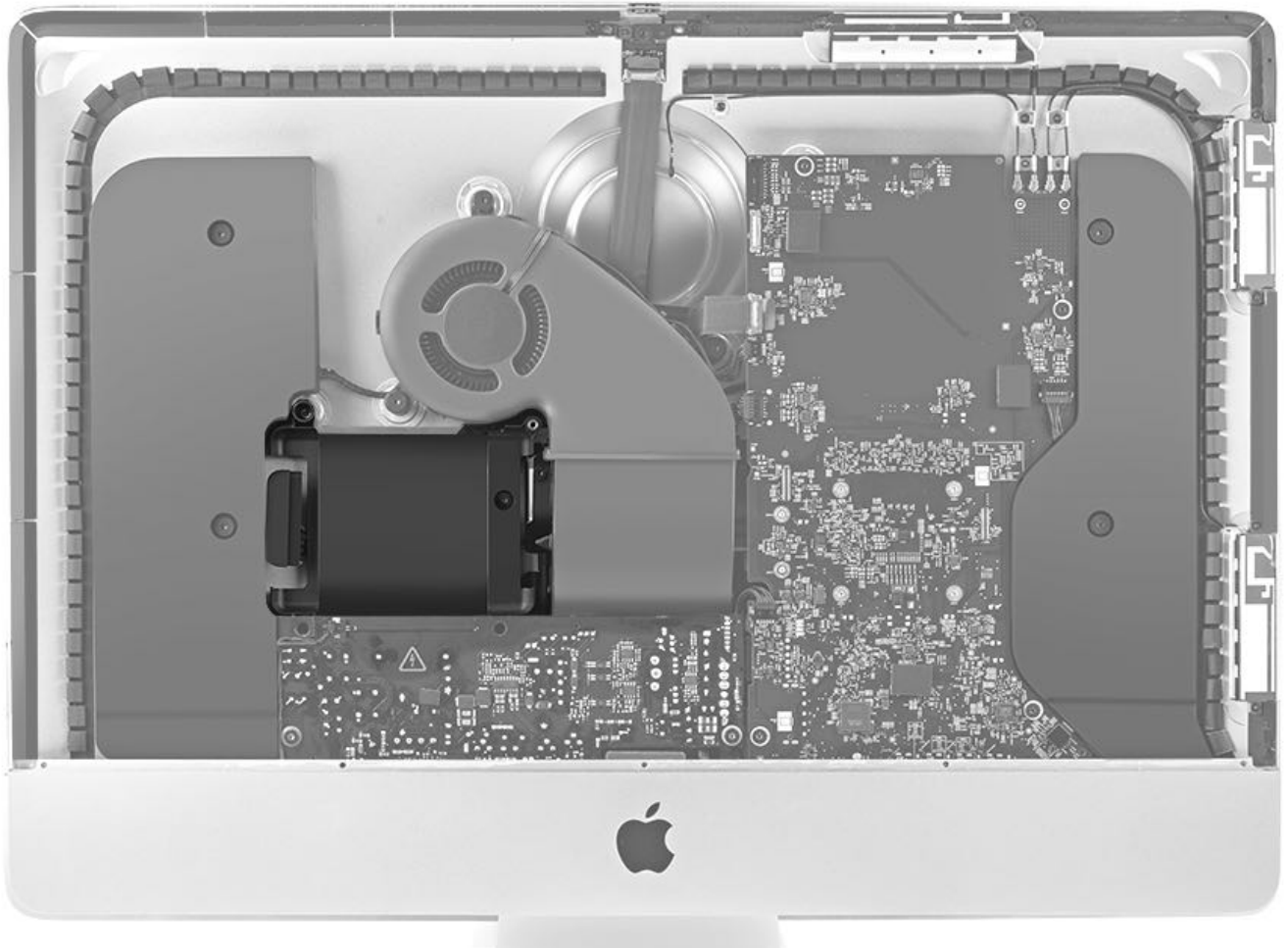
# Hard Drive Cradle

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

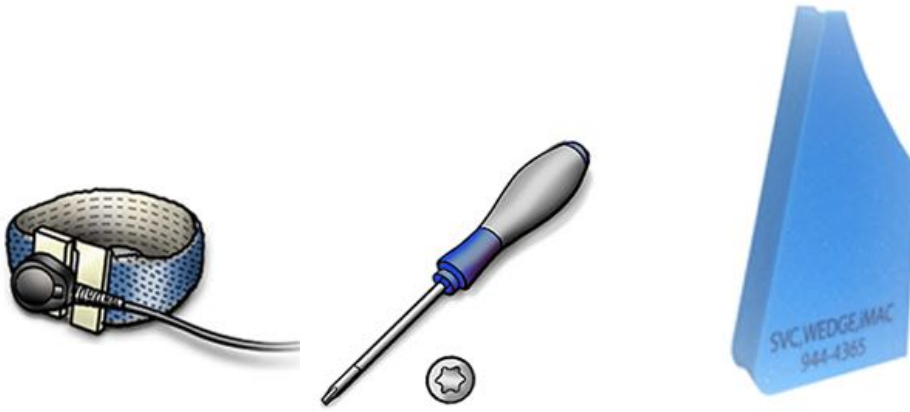
Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Hard drive brackets](#)
- [Hard drive](#)



## Tools

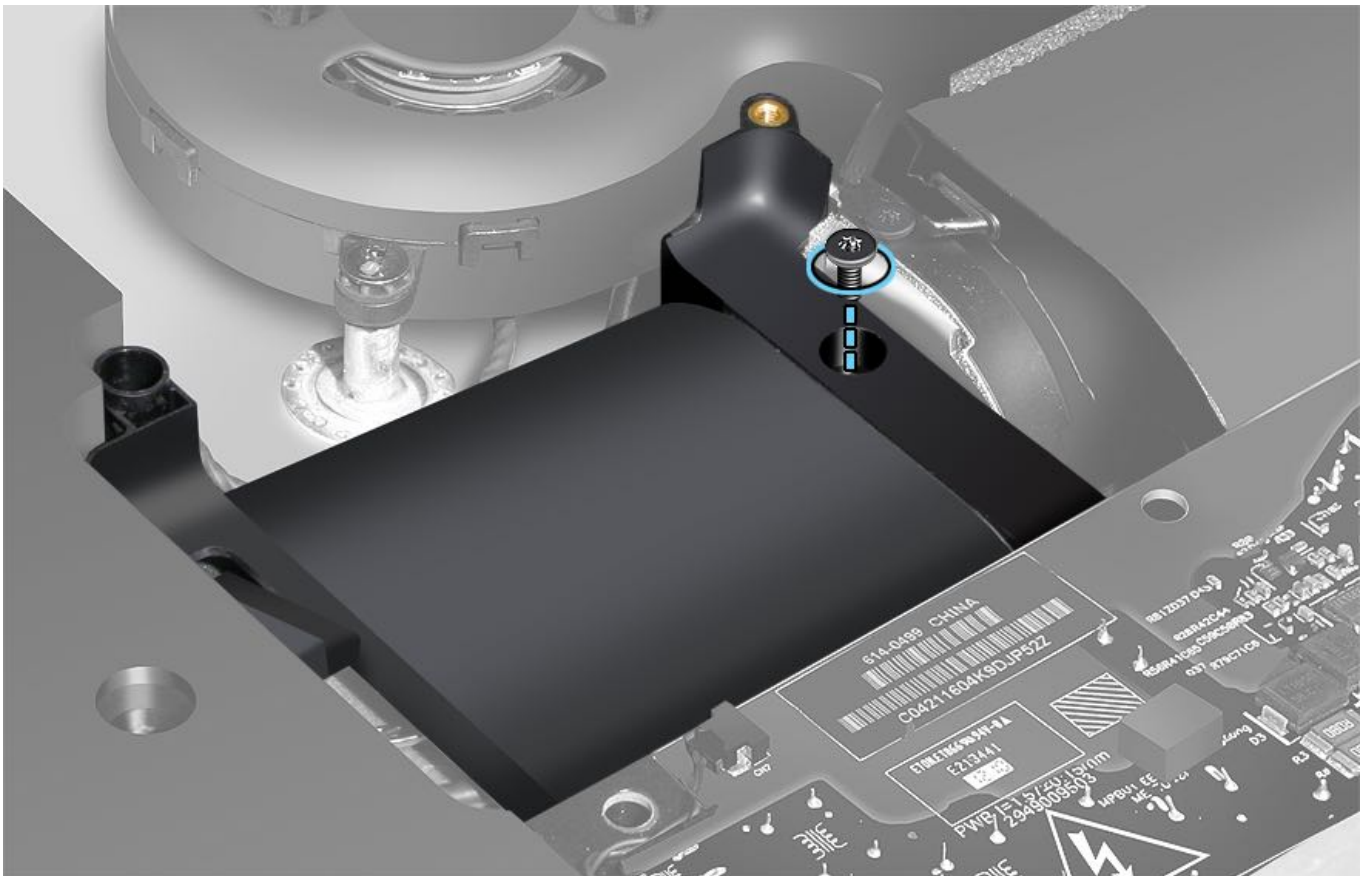
- ESD wrist strap and mat
- Torx T8 screwdriver (magnetized)
- Service wedge (iMac)



## Steps For Removal

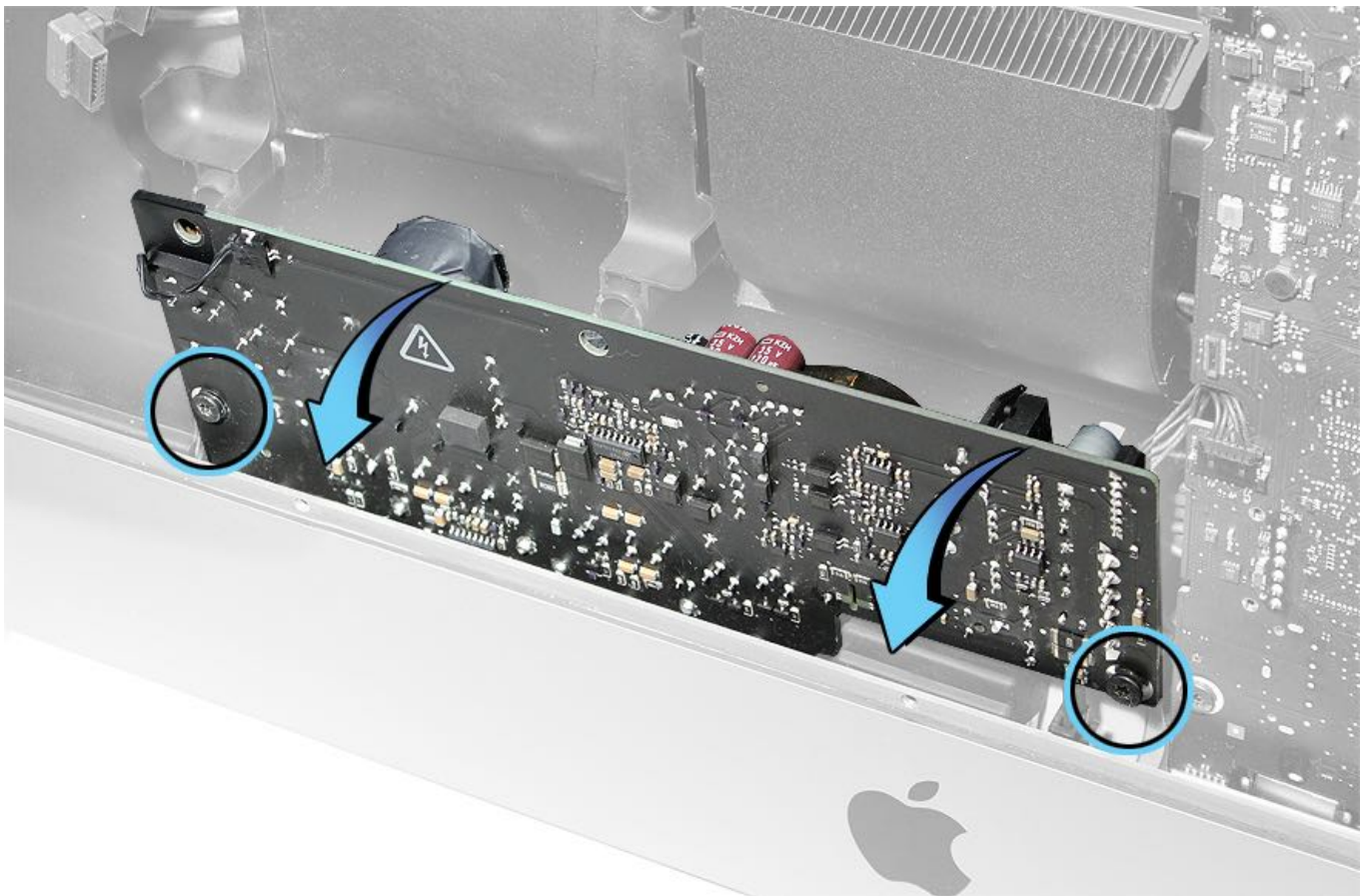
1. Remove one T8 screw from the hard drive cradle.

- T8: 923-0331, 7.2 mm



2. Loosen two T8 screws on the power supply.

**Note:** Be careful not to break the power button cable that is connected in the top left corner of the power supply. The power button cable is part of the rear housing and is not available separately.



3. Pull the hard drive cradle up and over the screw boss.

4. Disengage the hard drive data cable and hard drive power cable from the underside of the hard drive cradle.



### Steps For Reassembly

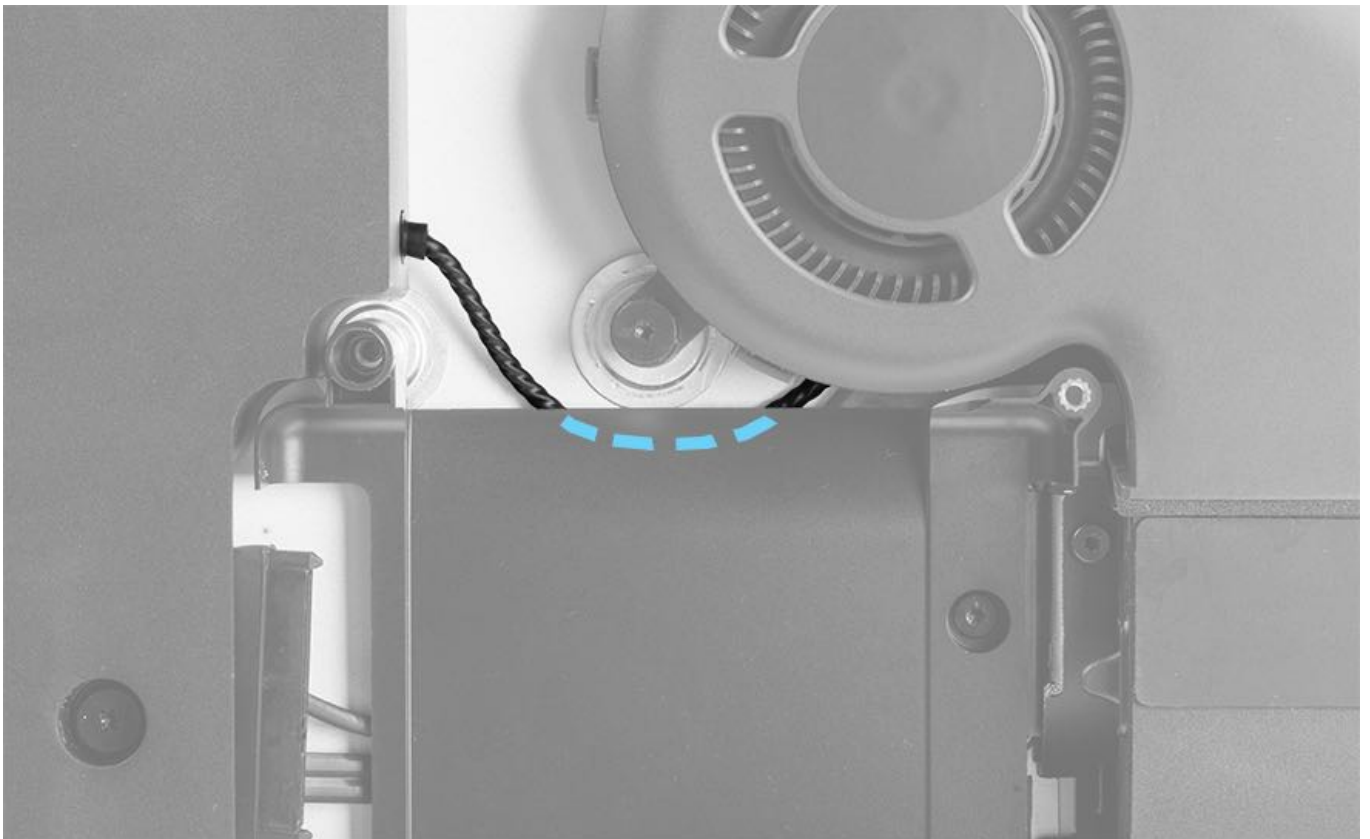
1. Lift the power supply and ease the hard drive cradle over the screw boss.

2. Route the hard drive data cable and hard drive power cable through the underside of the hard drive cradle.



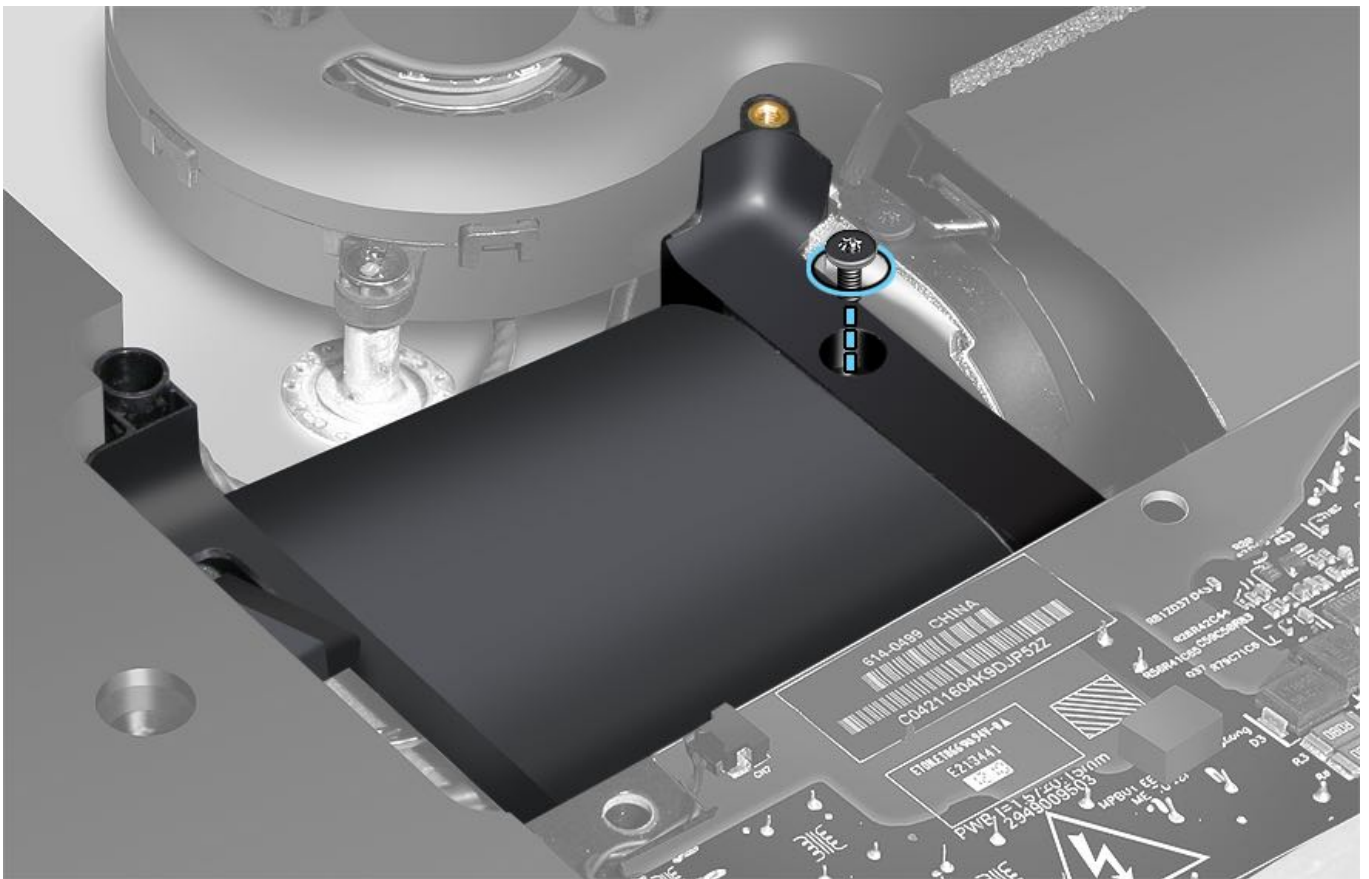


**Caution:** Note the correct routing of the left speaker cable and be careful not to pinch the cables under the hard drive cradle.

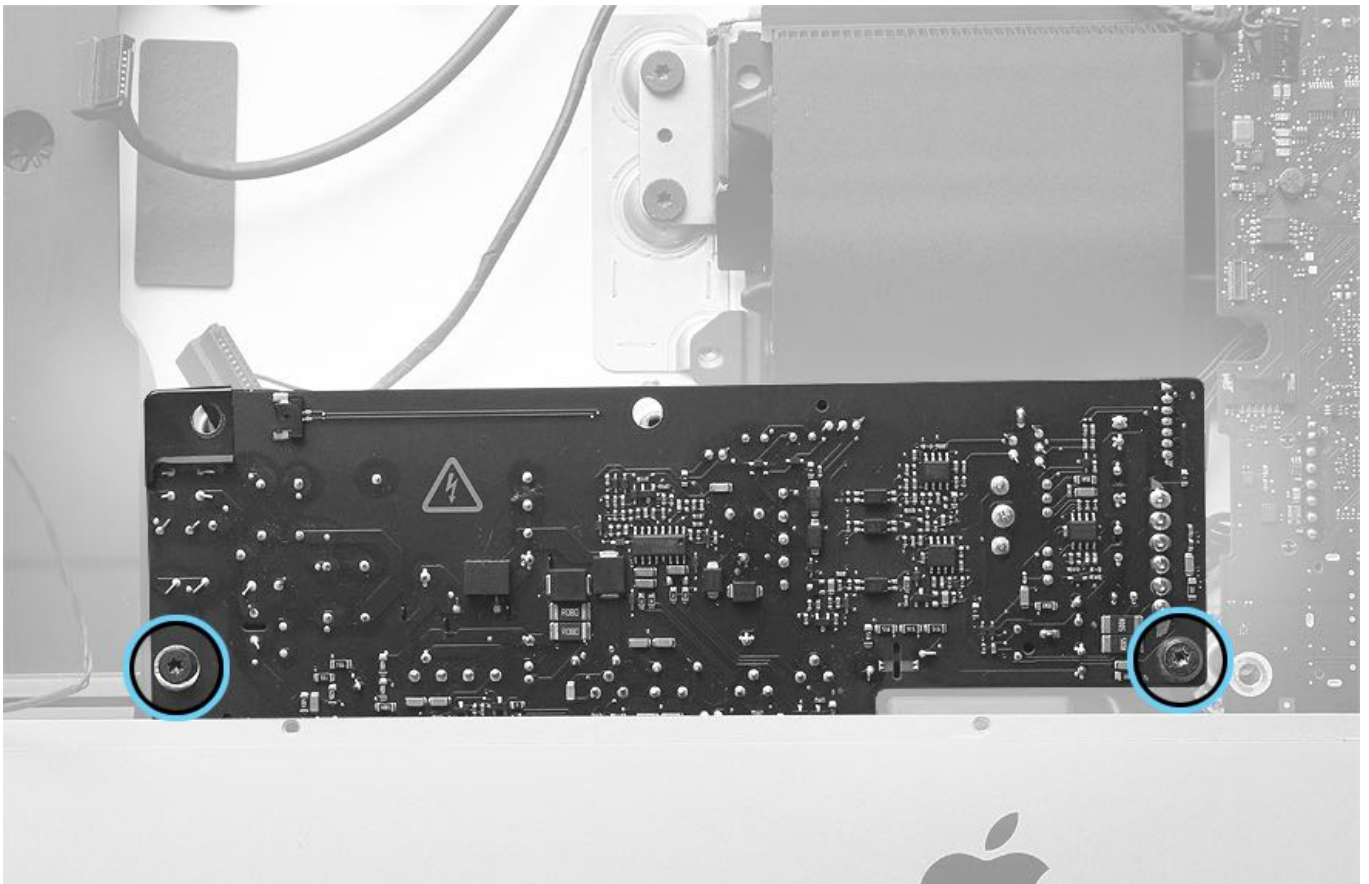


3. Install one T8 screw into the hard drive cradle.

- T8: 923-0331, 7.2 mm



4. Tighten two T8 screws on the power supply.



5. Reinstall the [hard drive](#).

6. Reinstall the [hard drive brackets](#).

7. Install new [display panel VHB strips](#).

8. Reinstall the [display panel](#).



# Chin Strap

## First Steps

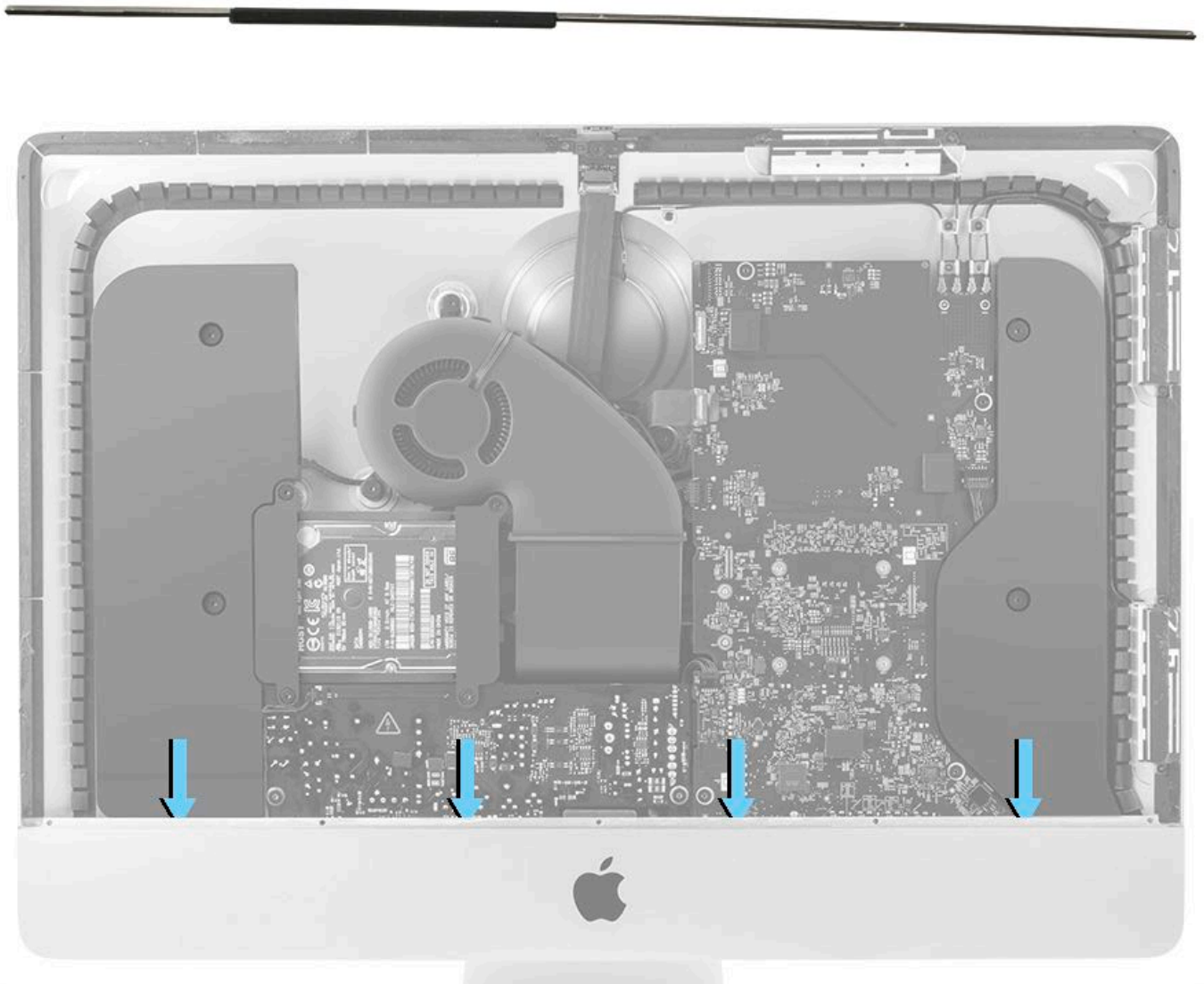
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)

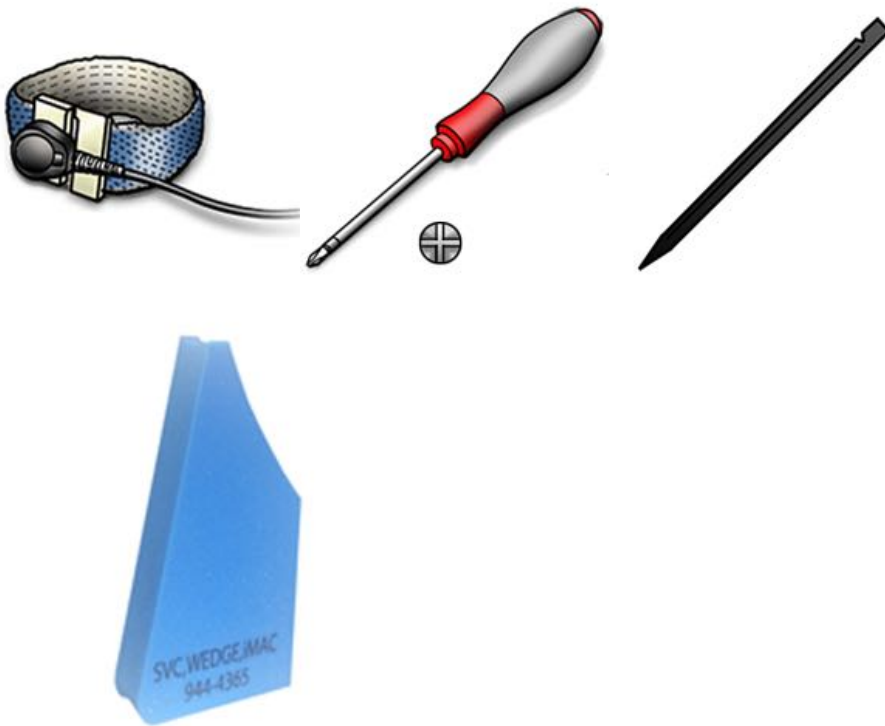
**Important:** The chin strap must be removed in order to repair any component that sits below the chin.

This is the chin strap. It is located on the lower, bottom edge of rear housing, as shown by the arrows below.



## Tools

- ESD wrist strap and mat
- Phillips #00 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)

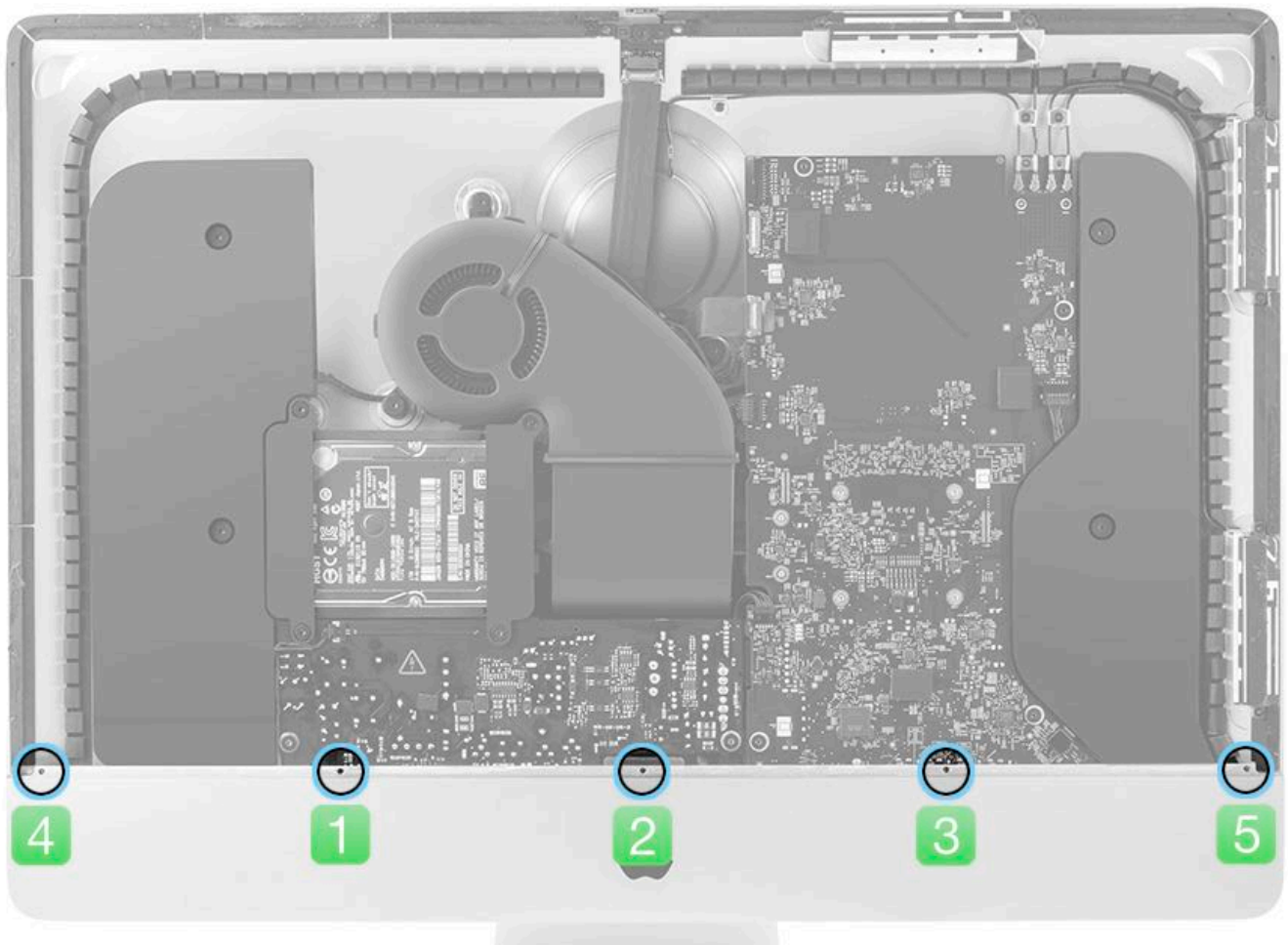


## Steps For Removal

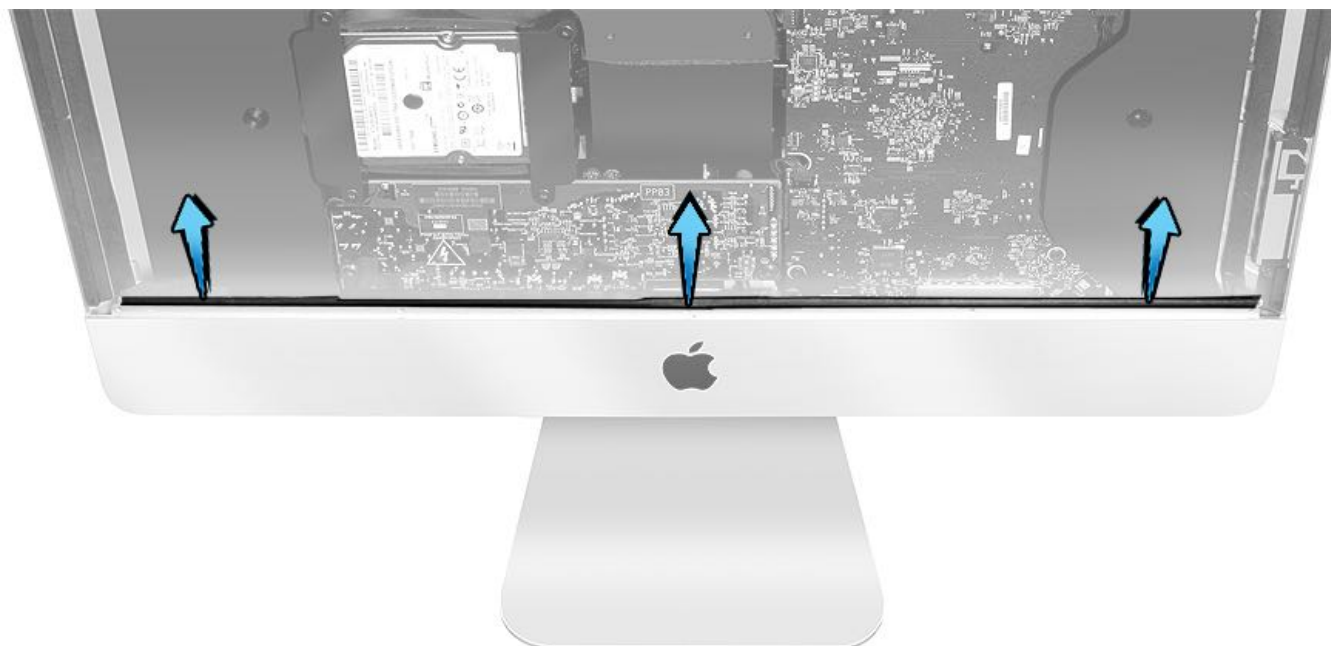
1. Remove five Phillips #00 chin strap screws in the order shown below.

**Note:** Chin strap screws are very small. There are four long screws and one short screw. The short screw is in the center hole.

- Phillips #00: 923-0338, 3 mm, four
- Phillips #00: 923-0335, 1.5 mm, center screw, one



2. Gently pull the chin strap out of the chin.



## Steps For Reassembly

1. Insert the chin strap. Be sure the screw holes point outward, toward the front of the computer. The Mylar ridge on the chin strap should be positioned toward the left.

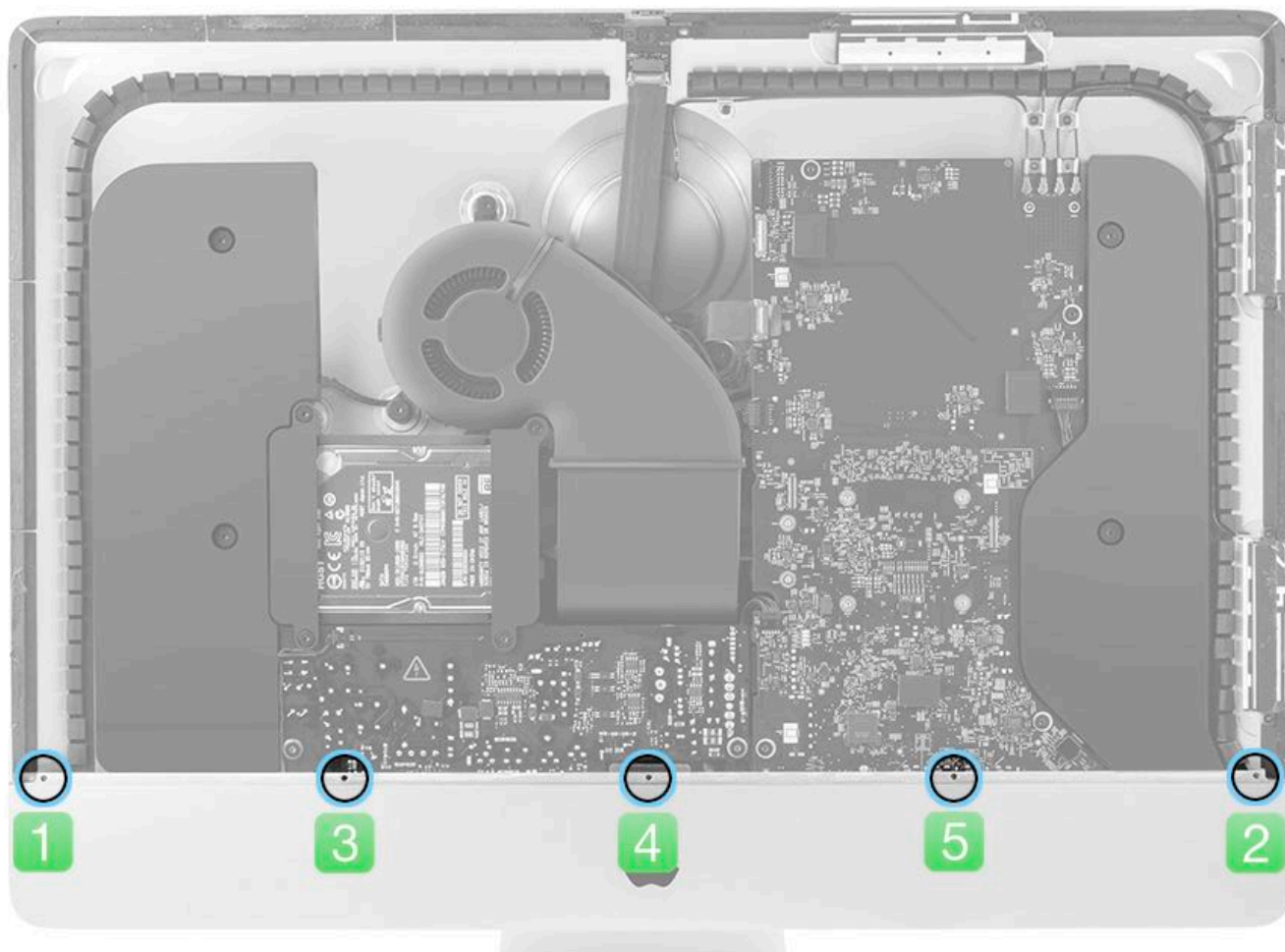


**Note:** Chin strap screws are very small. There are four long screws and one short screw. Install the short screw in the center hole.

2. Install:

- Phillips #00: 923-0338, 3 mm, four
- Phillips #00: 923-0335, 1.5 mm, center screw, one

in the following order:



**Note:** For easier installation of the small chin strap screws, use a black stick to press the chin strap against the front frame if needed. **Do not** press on the chin. **Always** press on the back of the chin strap to bring it toward the screw.



3. Install new [display panel VHB strips](#).

4. Reinstall the [display panel](#).





# Left Speaker

## First Steps

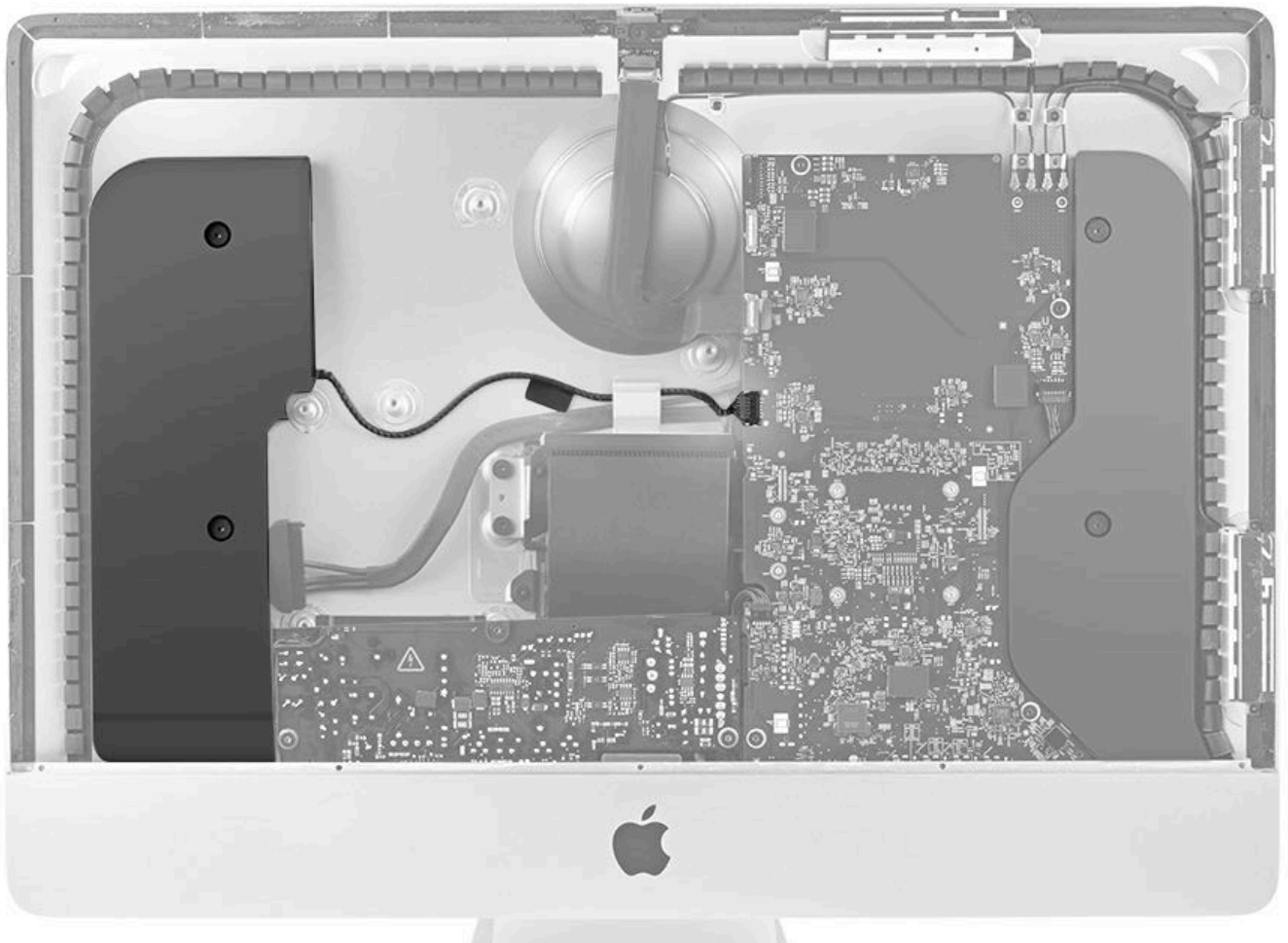
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)

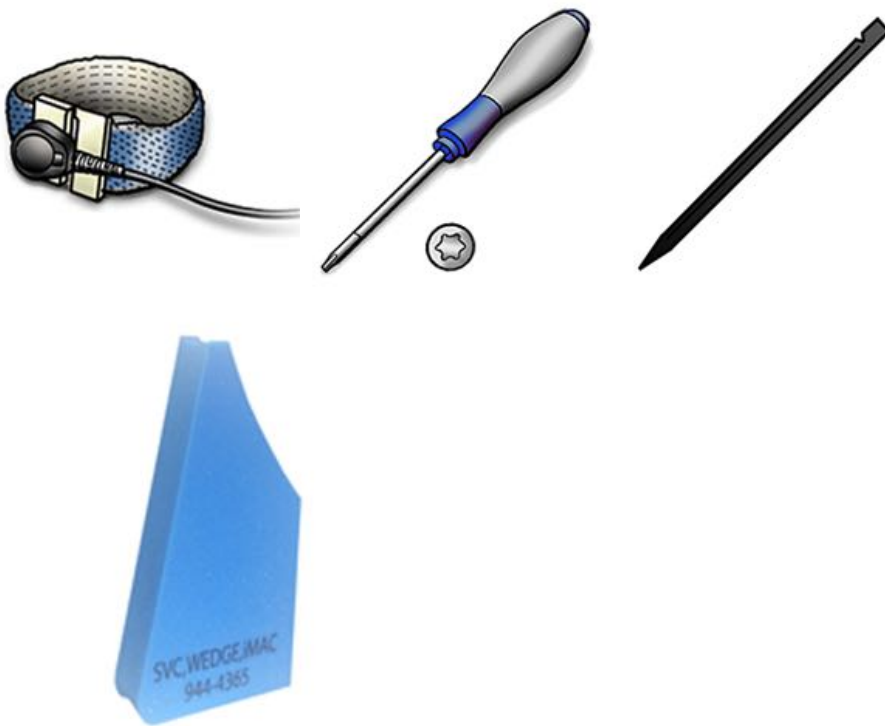
**Note:** The chin strap must be removed for this repair.

**Important:** Speakers must be replaced in pairs. If you replace the left speaker, then you must also replace the right speaker. For right speaker removal and reassembly instructions, refer to article [RP1358: Right Speaker](#).



## Tools

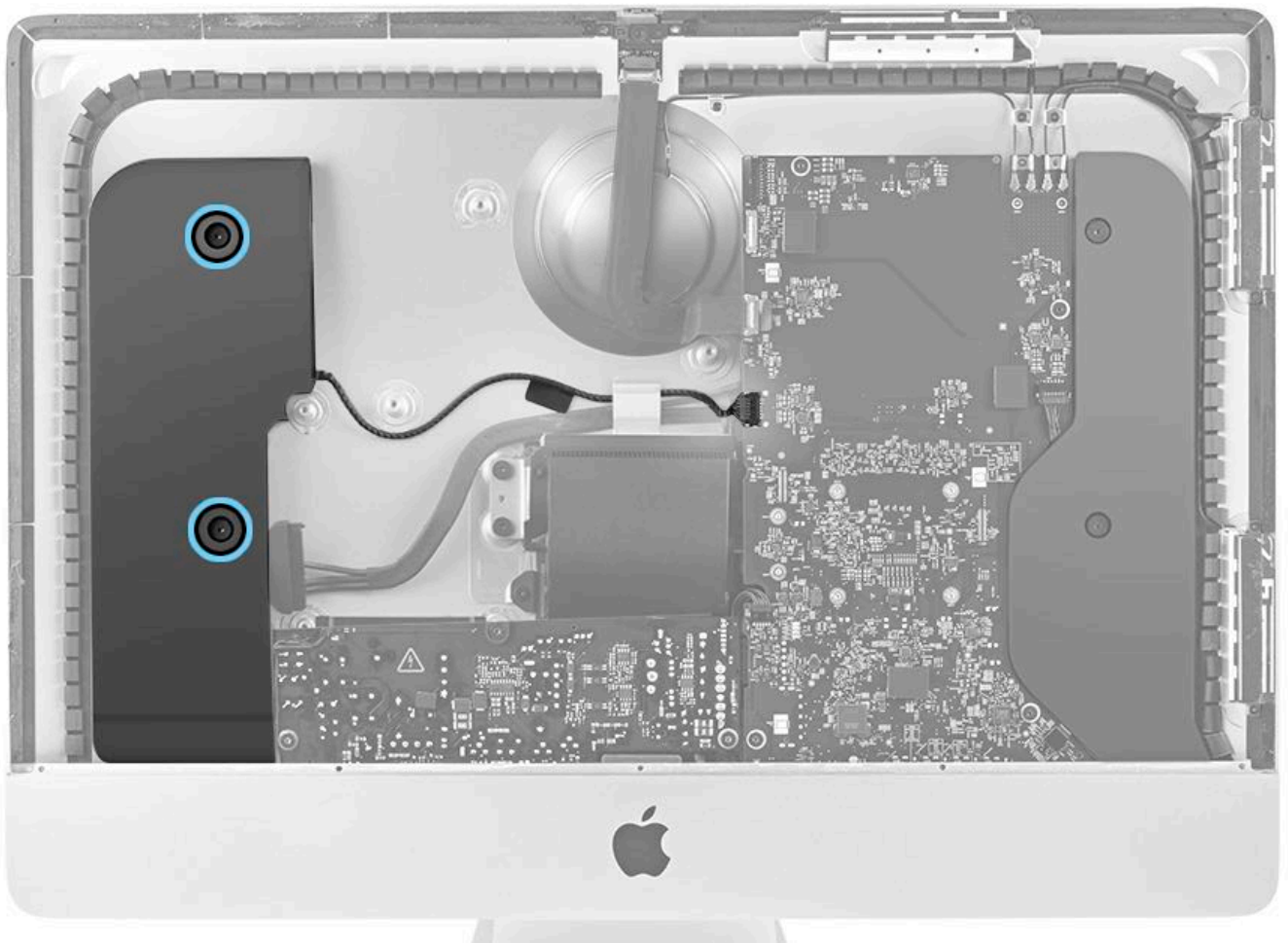
- ESD wrist strap and mat
- Torx T10 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)



## Steps For Removal

1. Remove two T10 screws from the left speaker. **Note:** The screws tighten into rubber grommets and may remain in the screw holes when the speaker is removed.

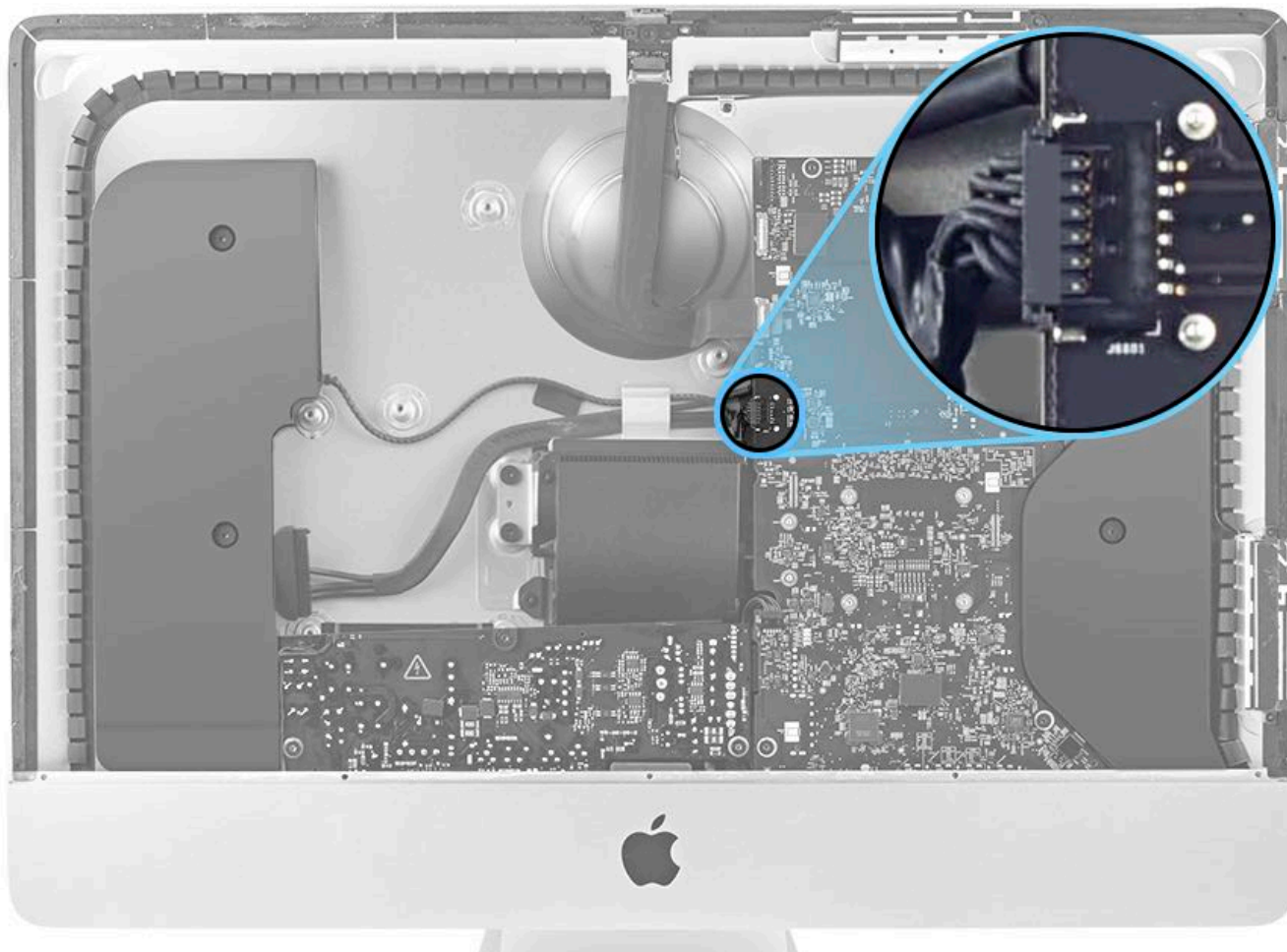
- T10: 923-0333, 10 mm



2. Disconnect the speaker cable from the logic board.

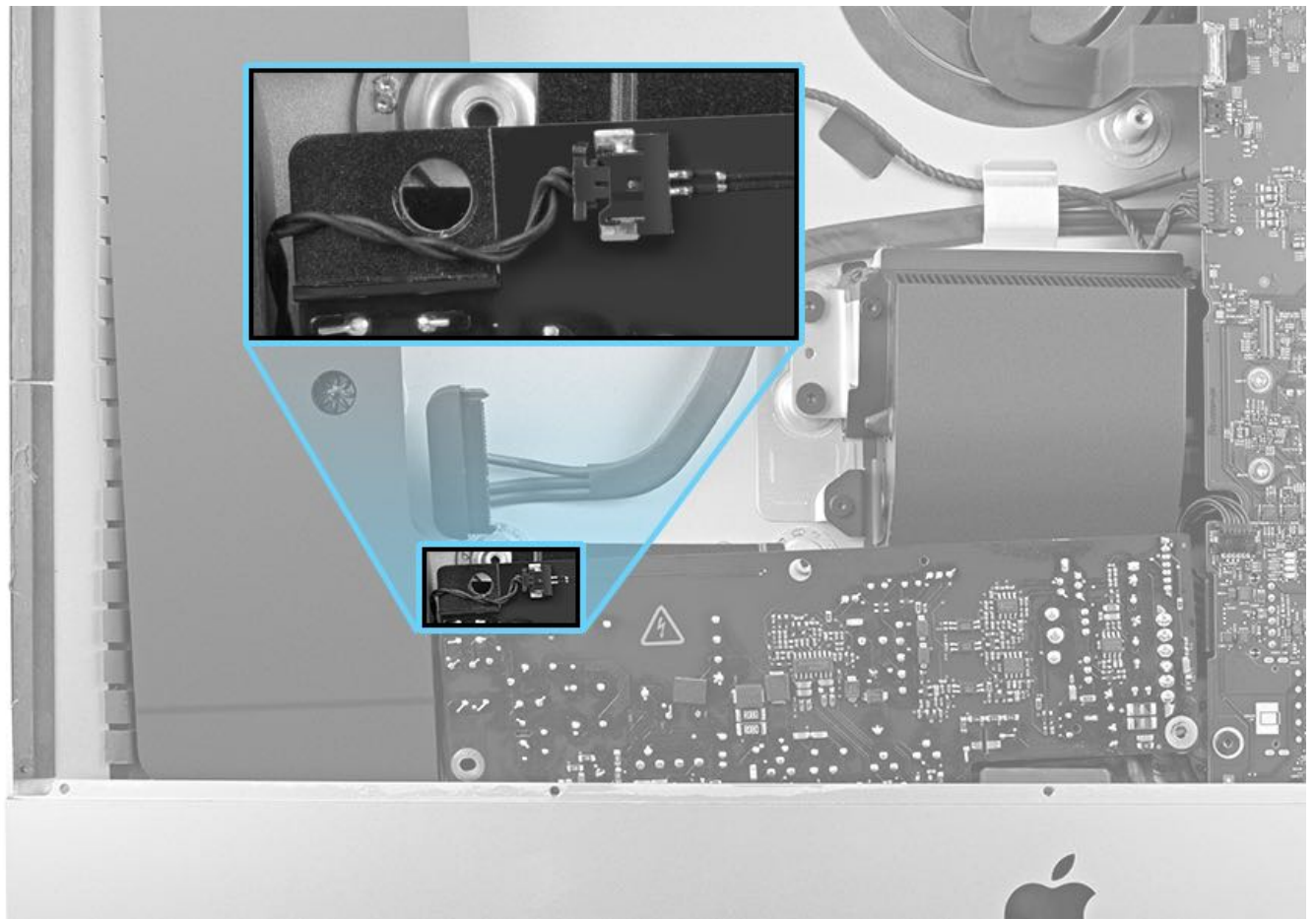
**Caution:** To avoid logic board damage, squeeze the sides of the connector while pulling the cable out. Not squeezing the

sides of the connector may cause damage to the logic board receptacle.



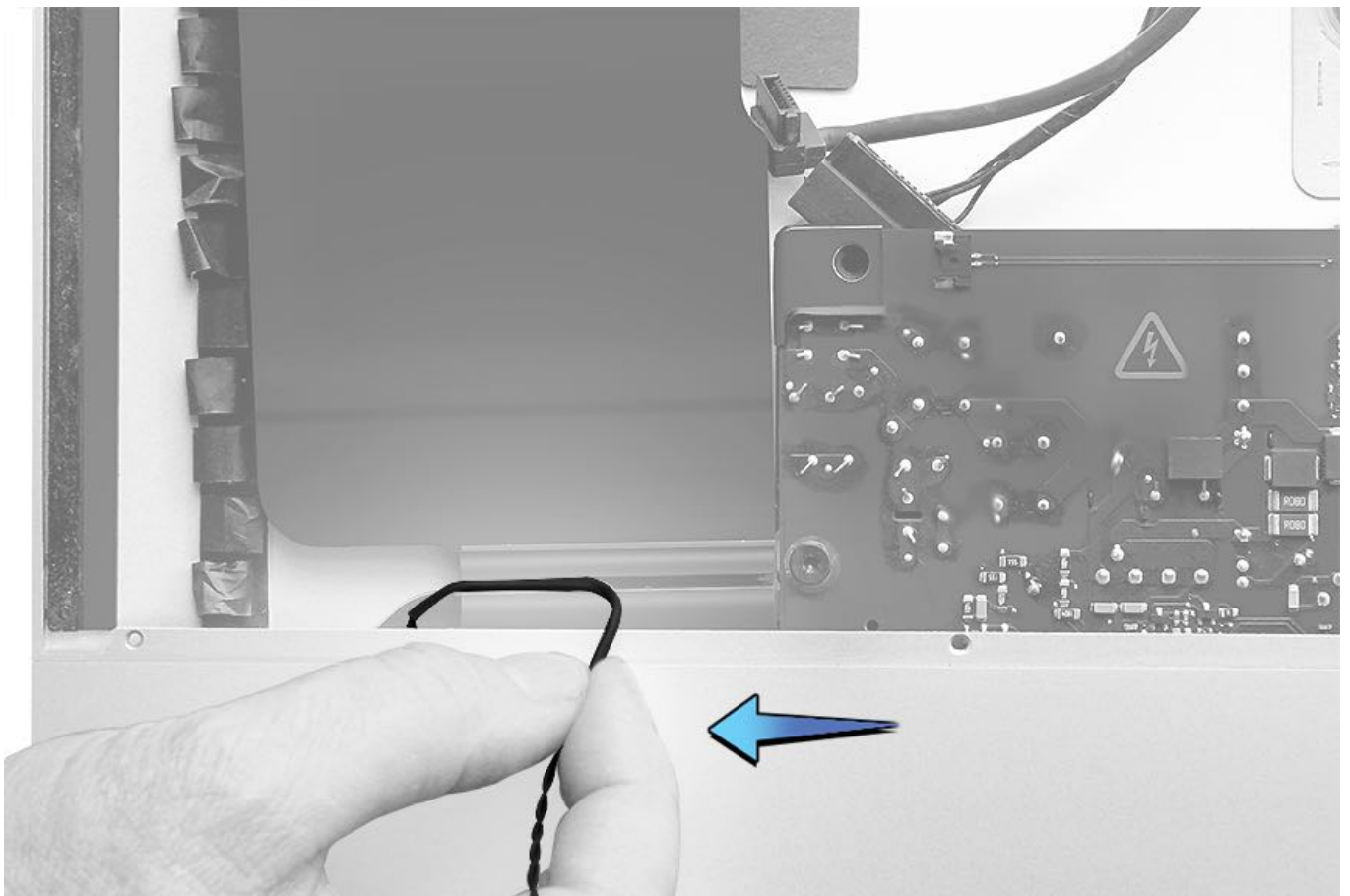
3. Use a black stick to disconnect the power button cable from the power supply.

**Caution:** A damaged power button cable requires a rear housing replacement. The power button cable is not available separately.



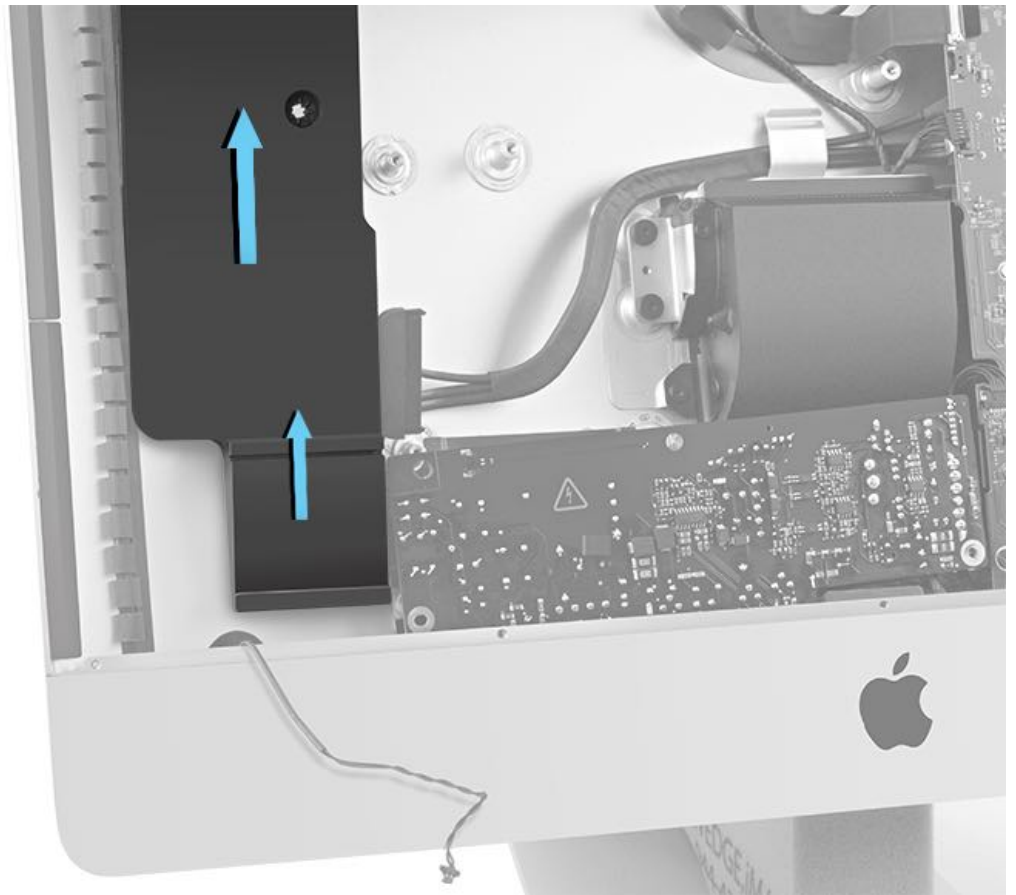
4. Pull the left speaker up enough to see the power button cable routing. Carefully remove the power button cable from the routing groove.

**Caution:** Failure to remove the power button cable from its routing can result in a damaged cable. A damaged power button cable requires a rear housing replacement.



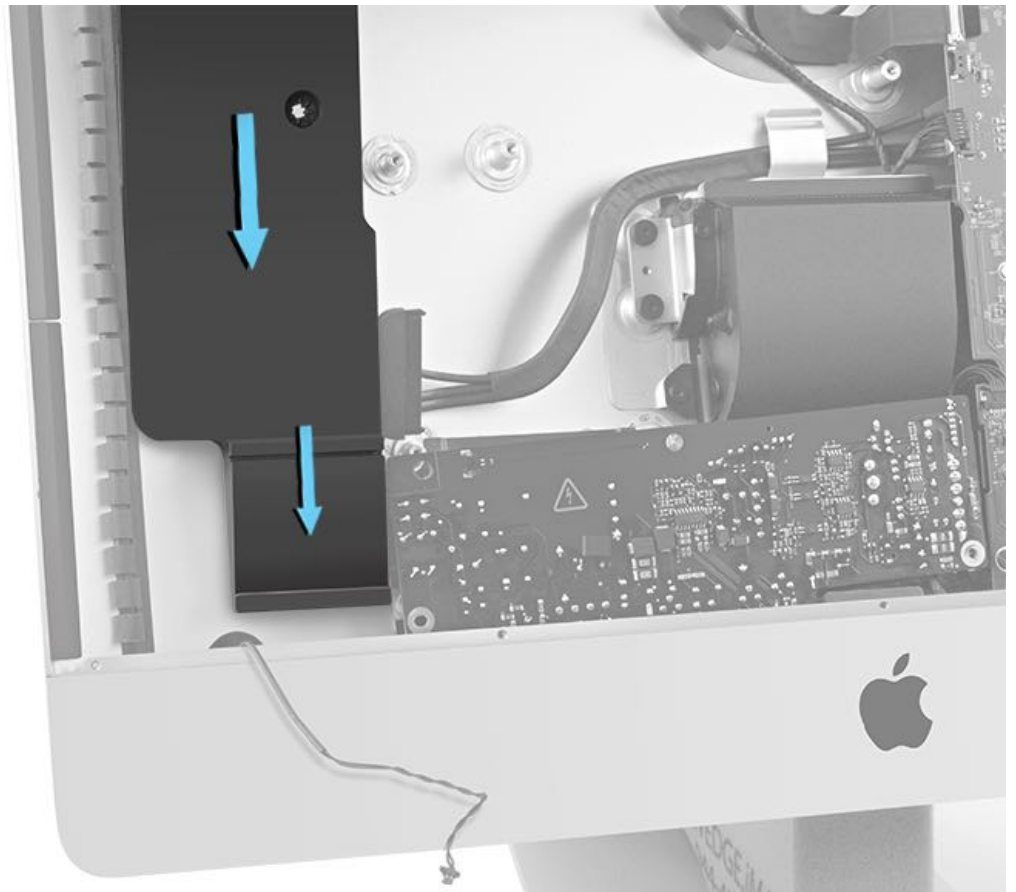
5. Remove the left speaker from the rear housing.





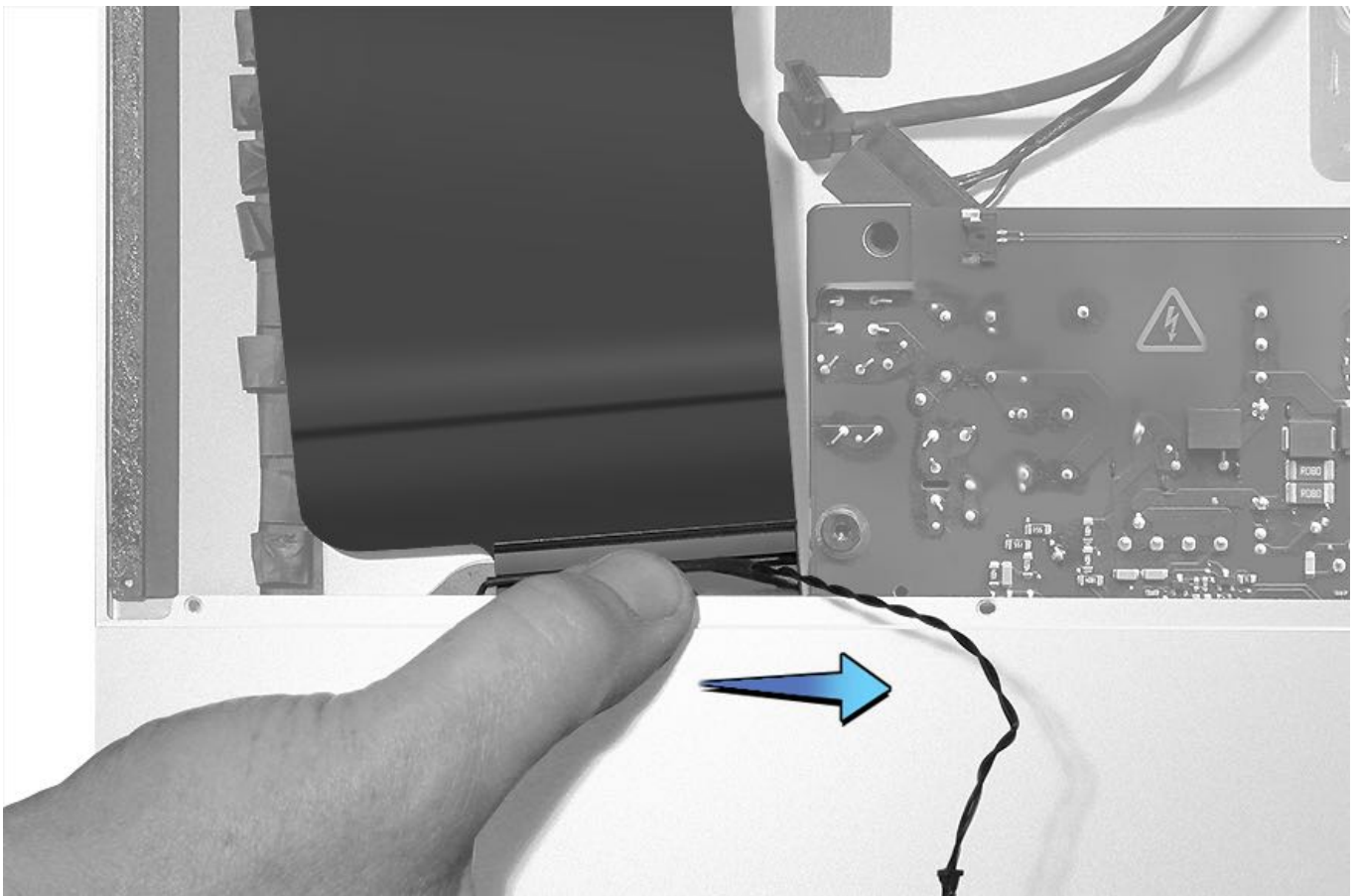
### Steps For Reassembly

1. Insert the left speaker partially under the rear housing chin.



2. Install the power button cable into its routing groove on the left speaker.





3. Continue to route the power button cable along the side of the left speaker.

**Caution:** If the power button cable is not securely routed in the vertical channel, then the cable may come loose and be damaged by the power supply. A damaged power button cable requires a rear housing replacement.



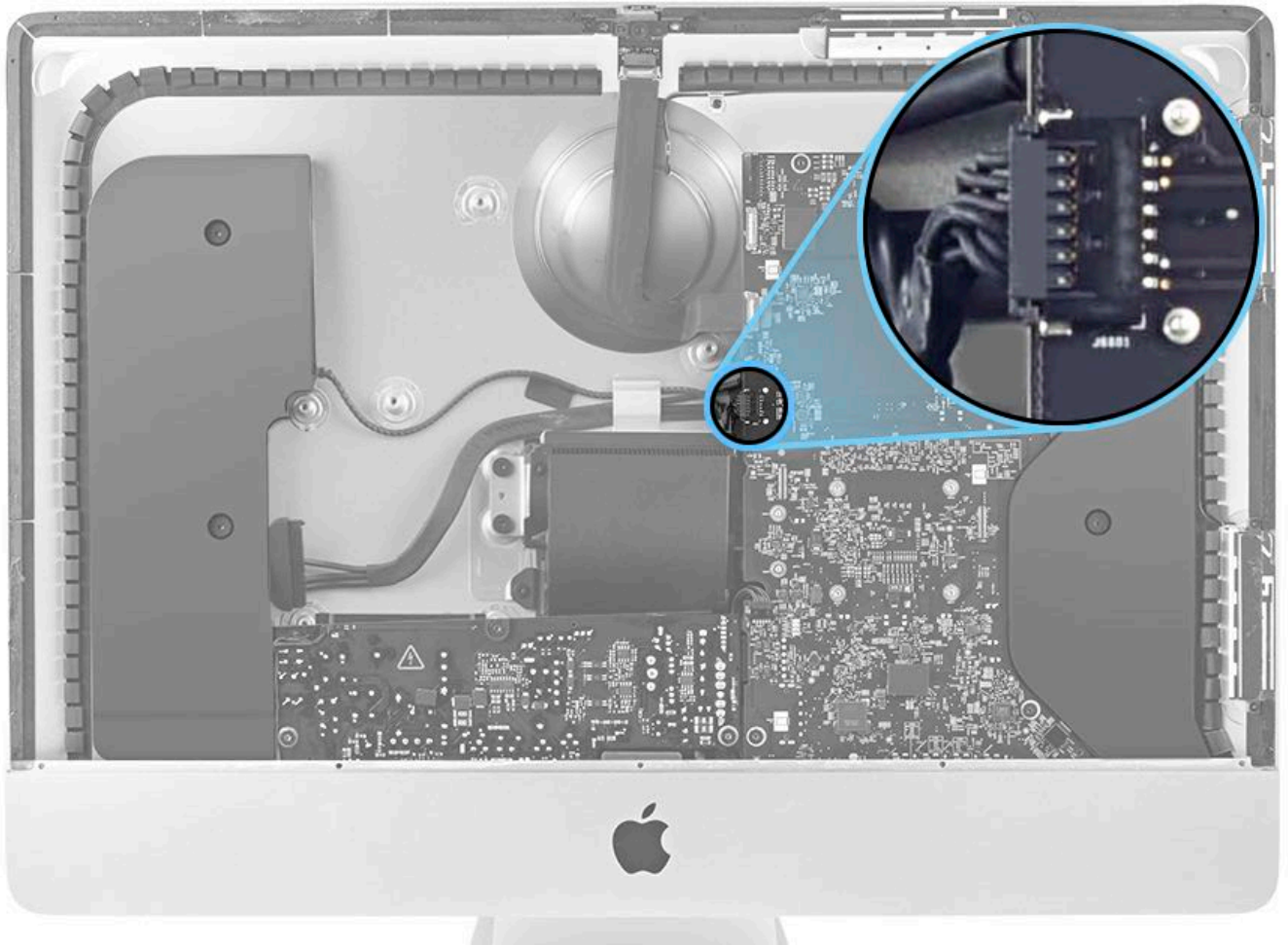
4. Carefully insert the left speaker all the way into the rear housing chin. Ensure that the power button cable does not bind or slip out of the routing channel as you position the speaker.

**Important:** Push firmly to ensure that the speaker sits down in the chin as far as possible. If the speaker is not positioned correctly in the chin, then it can cause display interference issues.

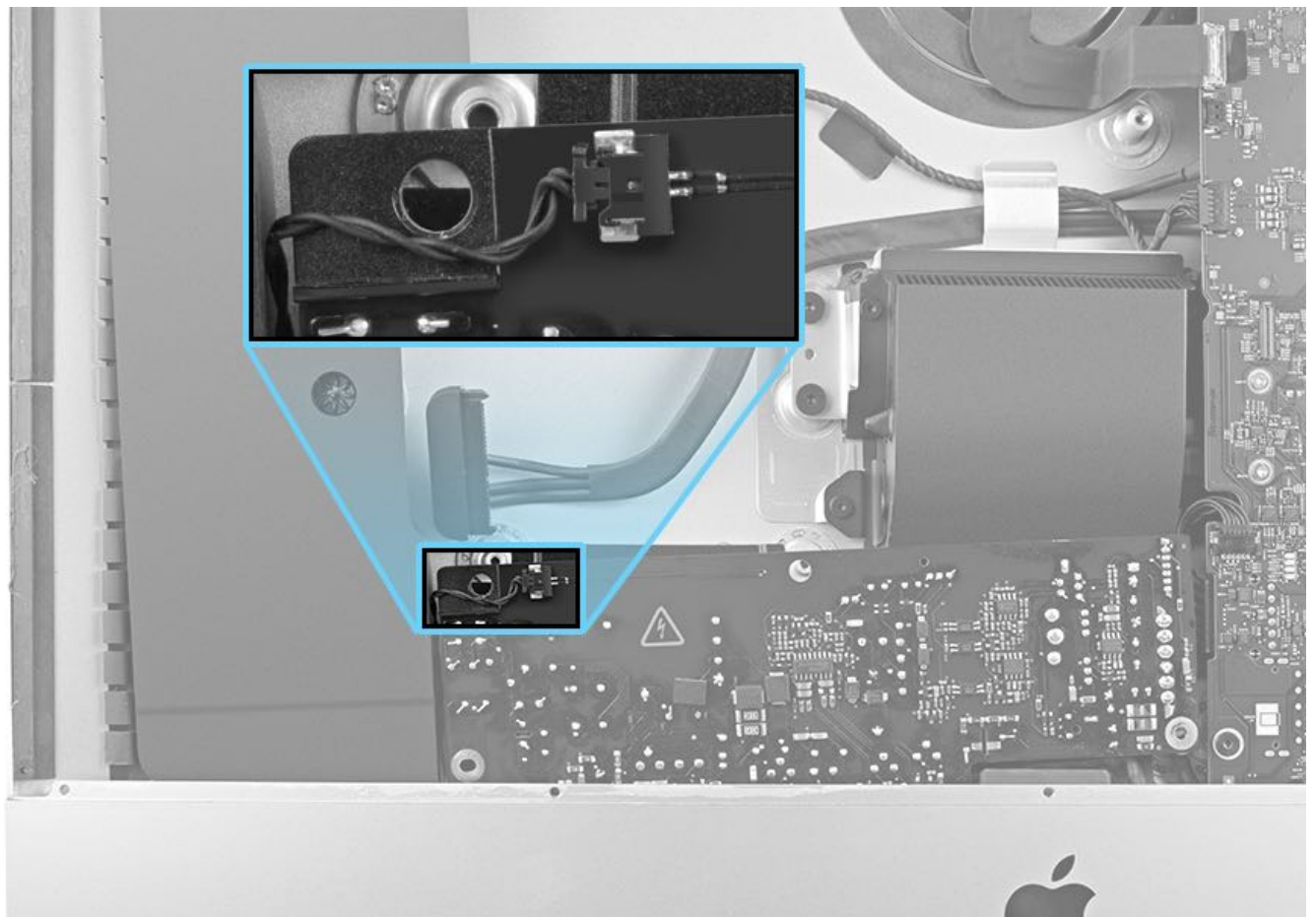
5. Reinstall two T10 screws to the left speaker.

- T10: 923-0333, 10 mm

6. Reconnect the speaker cable to the logic board.



7. Reconnect the power button cable to the power supply.



8. Reinstall the [chin strap](#).

9. Reinstall the [hard drive cradle](#).
10. Reinstall the [hard drive](#).
11. Reinstall the [hard drive brackets](#).
12. Reinstall the [fan](#).
13. Install new [display panel VHB strips](#).
14. Reinstall the [display panel](#).

# Right Speaker

## First Steps

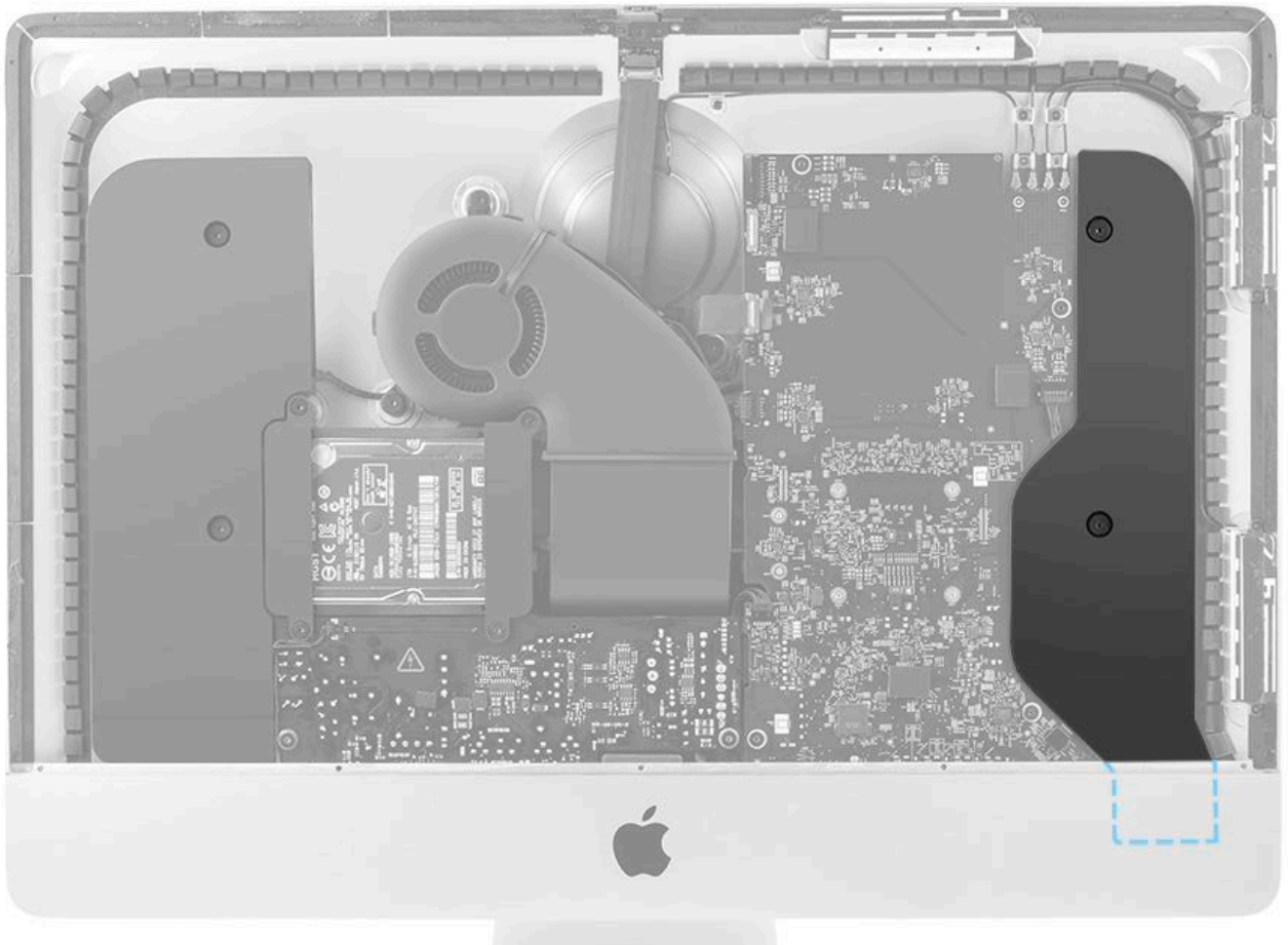
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Chin strap](#)

**Note:** The chin strap must be removed for this repair.

**Important:** Speakers must be replaced in pairs. If you replace the right speaker, then you must also replace the left speaker.



## Tools

- ESD wrist strap
- Torx T10 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)



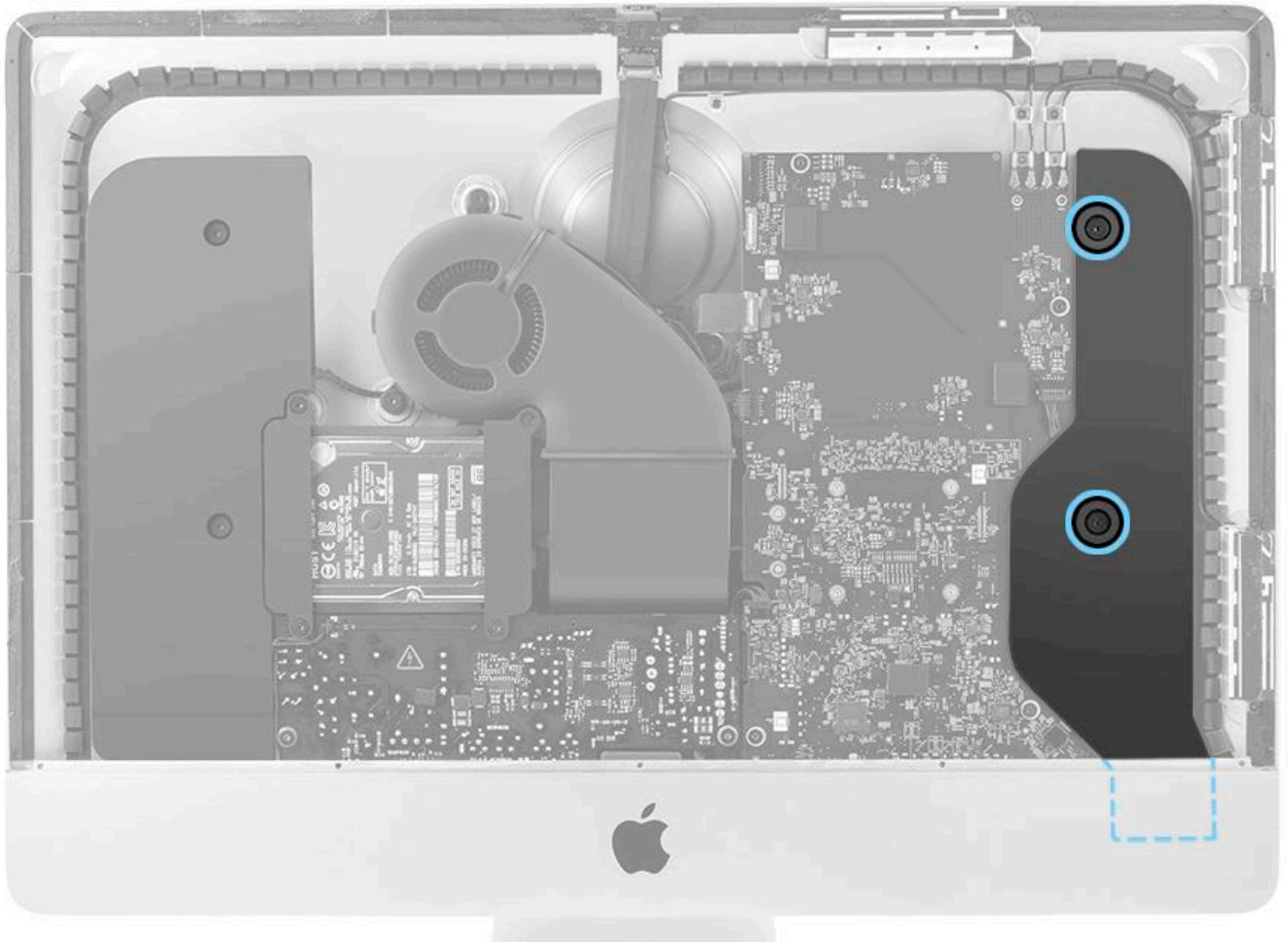




## Steps For Removal

1. Remove two screws from the right speaker. **Note:** The screws tighten into rubber grommets and may remain in the screw holes when the speaker is removed.

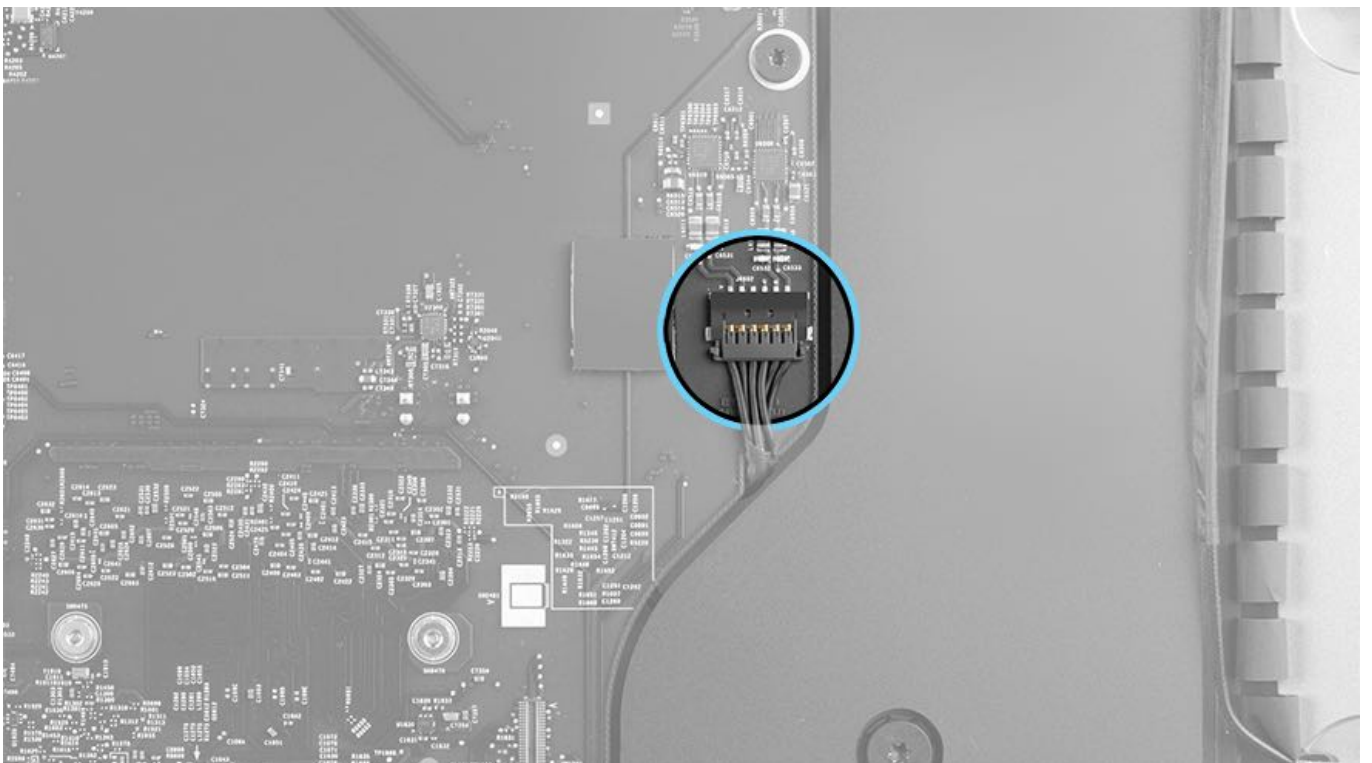
- T10: 10 mm (923-0333)



2. Remove the Wi-Fi antenna cable from the routing channel in the right speaker.



3. Disconnect the right speaker cable from the logic board.



4. Lift the speaker up and over the screw bosses while sliding the speaker up.



### Steps For Reassembly

1. Lightly place the speaker into position. Route the speaker cable into the notch on the logic board. Connect the speaker cable to the logic board.

**Caution:** To avoid damage to the speaker, connect the cable before inserting the speaker all the way into the rear housing.

2. Carefully insert the speaker all the way under the rear housing chin. Be careful with the audio jack inside the chin.

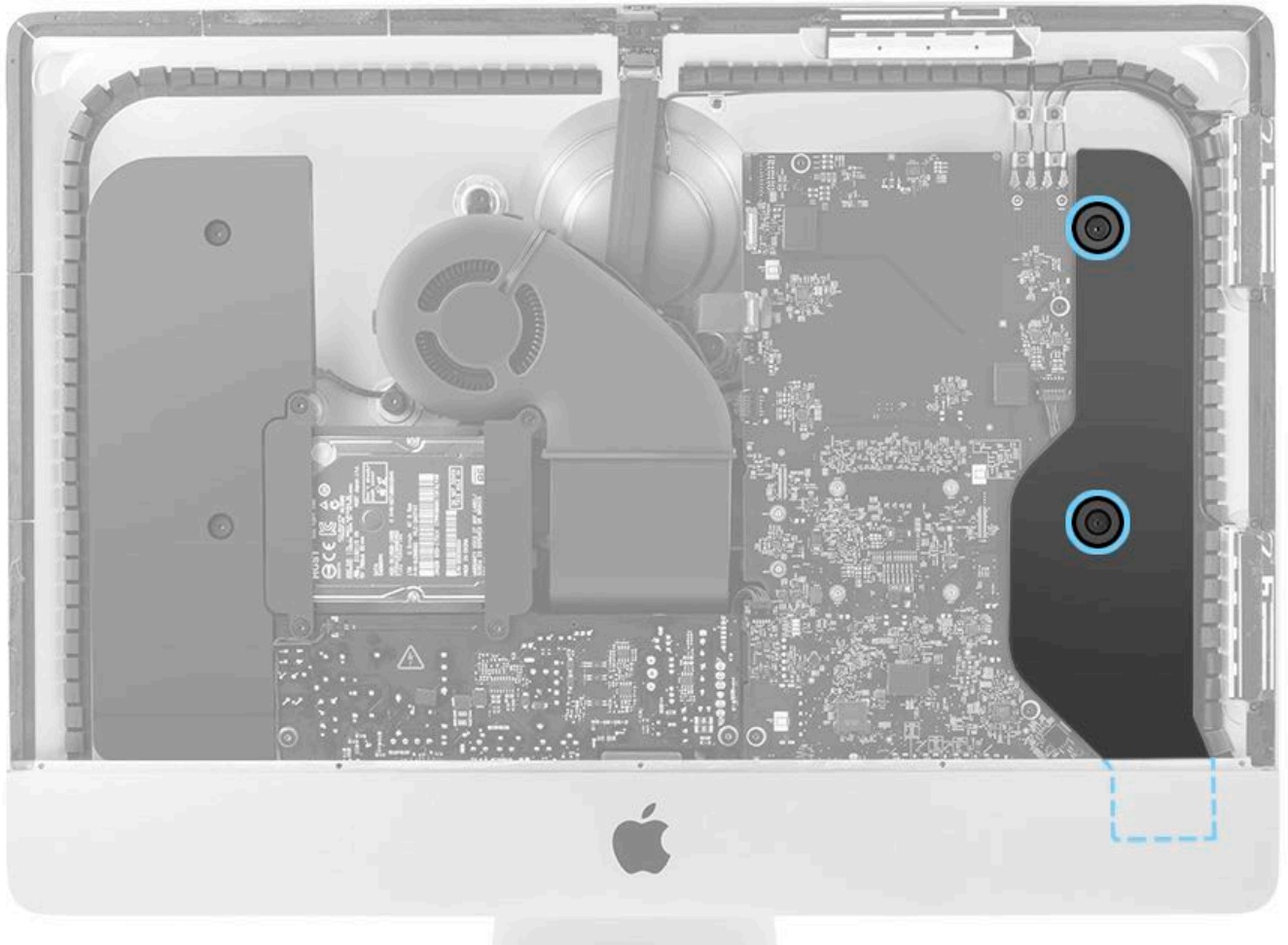
**Important:** Push firmly to ensure that the speaker sits down in the chin as far as possible. If the speaker is not positioned correctly in the chin, then it can cause display interference issues.



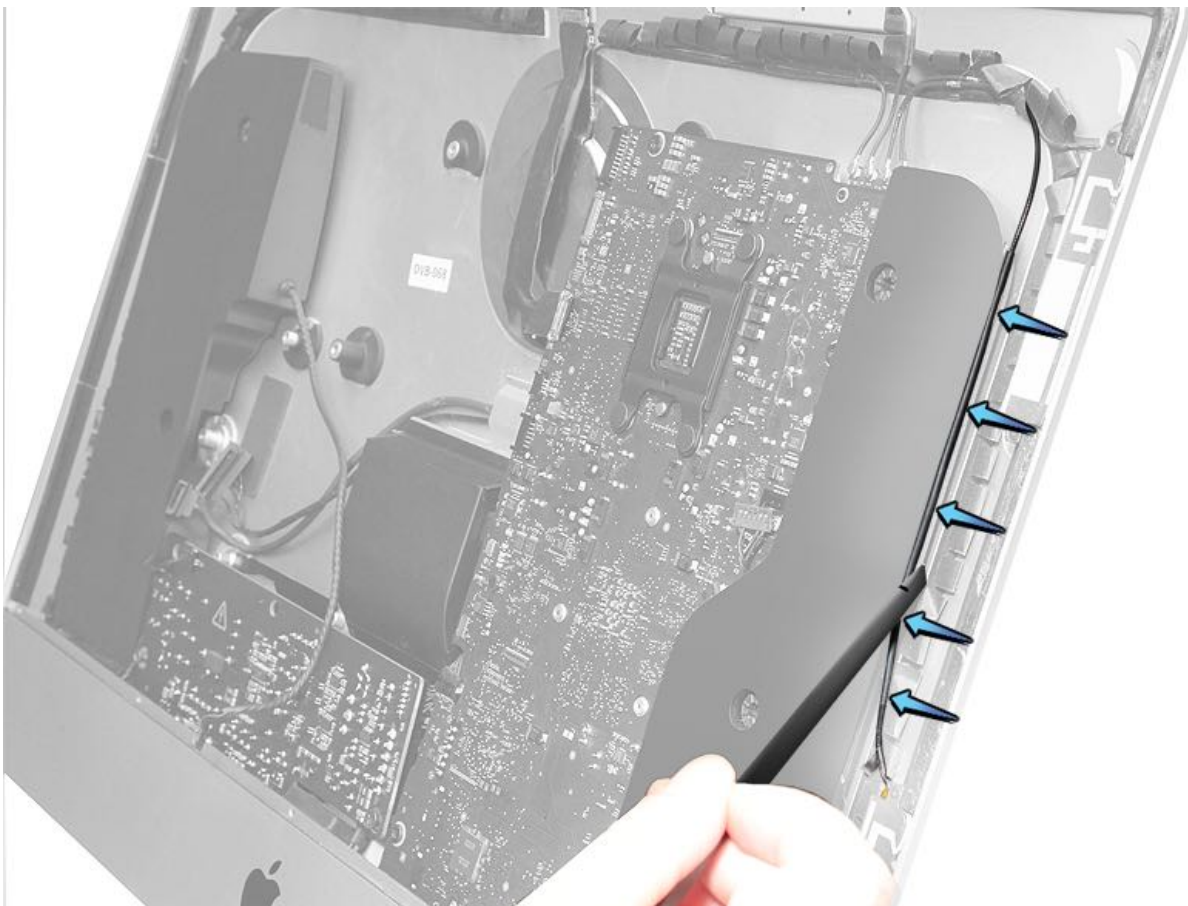
3. Install two screws into the right speaker.

- T10: 10 mm (923-0333)





4. Route the Wi-Fi antenna cable into the routing groove on the right speaker.



5. Reinstall the [chin strap](#).

6. Install new [display panel VHB strips](#).



7. Reinstall the [display panel](#).

# Logic Board

## First Steps

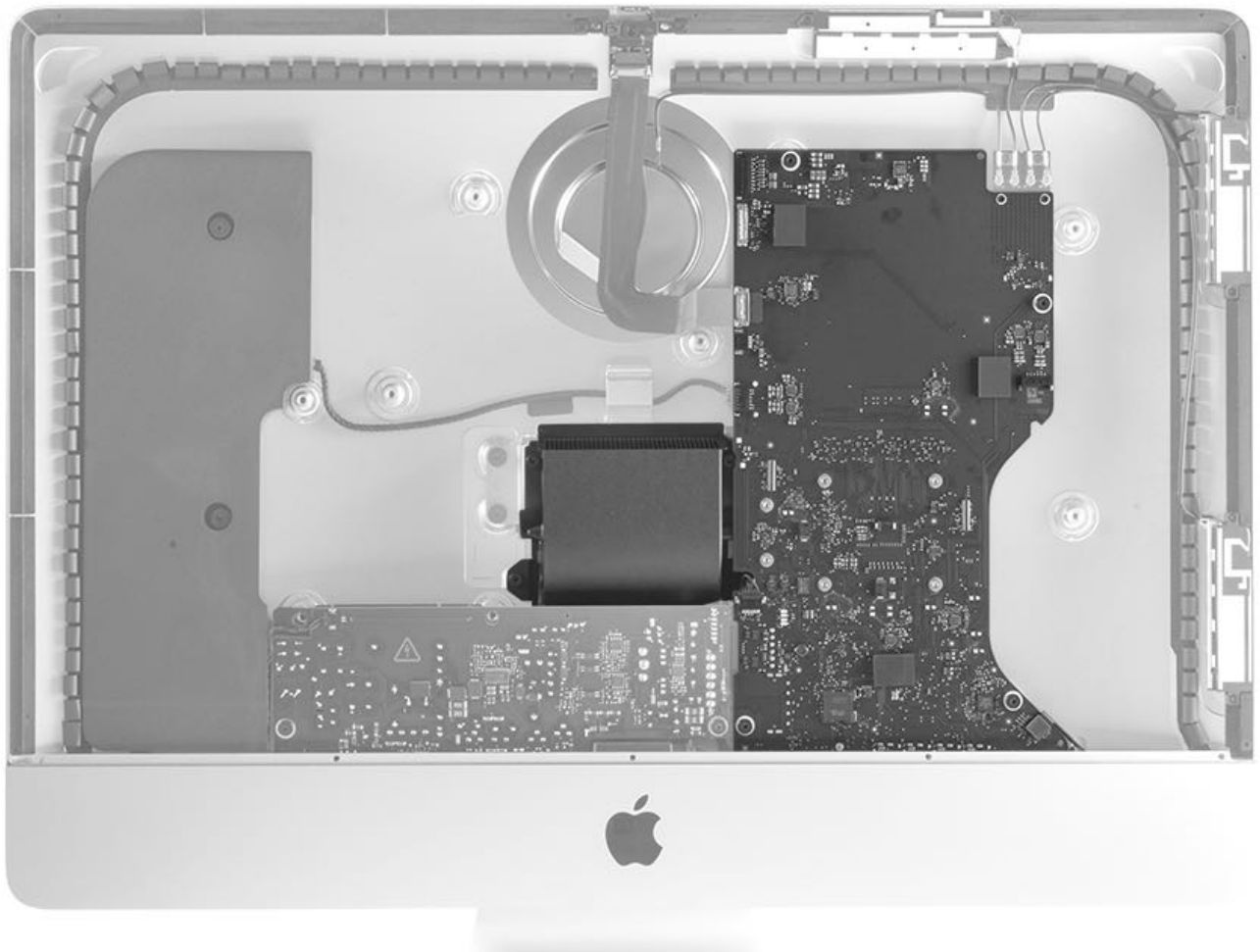
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV251: Logic Board Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)

**Note:** The chin strap must be removed for this repair.

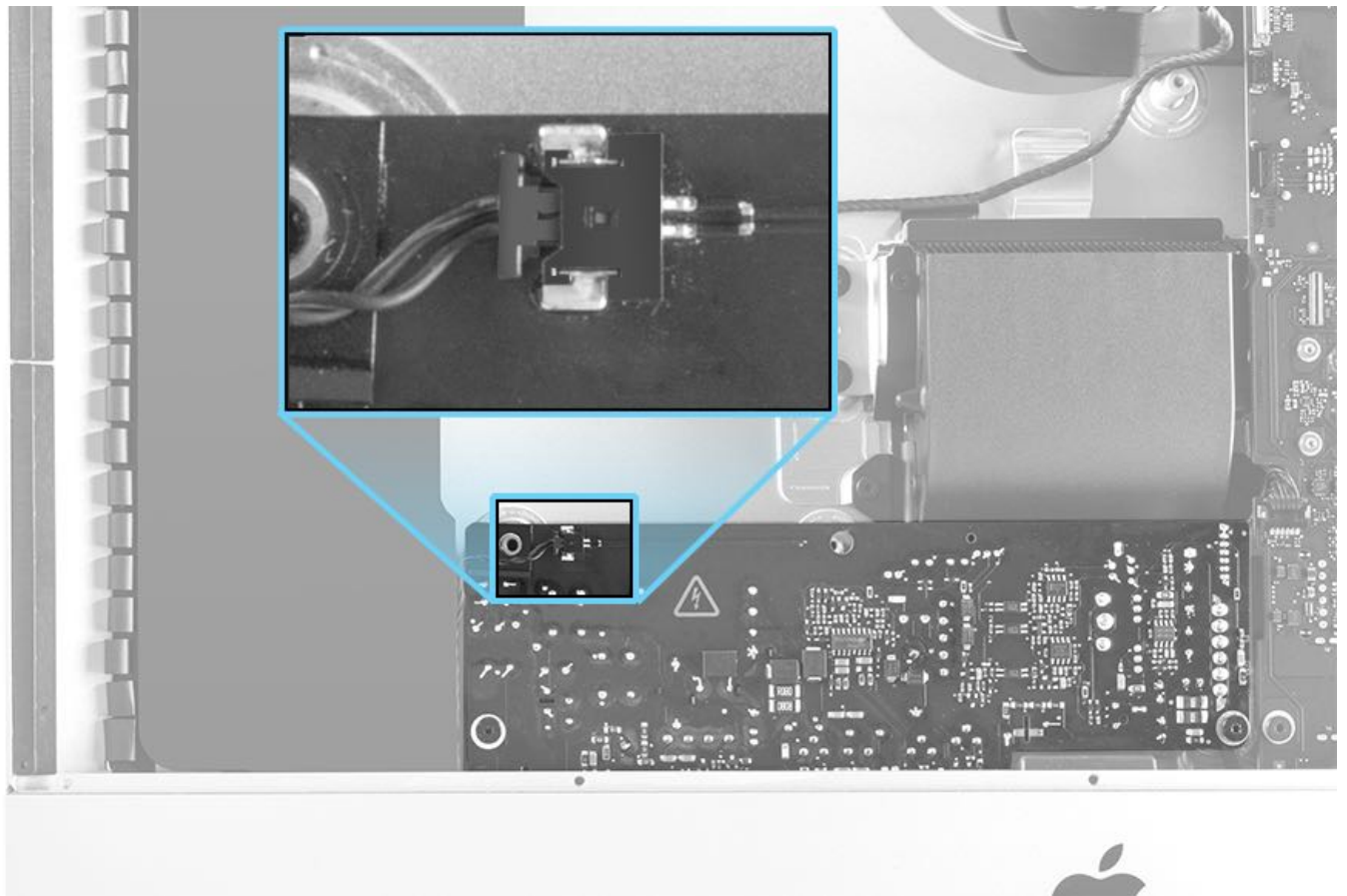


## Tools

- ESD-wrist strap and mat
- Torx T4 screwdriver (for wireless card removal)
- Torx T5 screwdriver
- Torx T8 screwdriver
- Black stick
- Service wedge (iMac)
- Wireless card support tool
- Mini DisplayPort or Thunderbolt and USB cables for reassembly (not pictured)

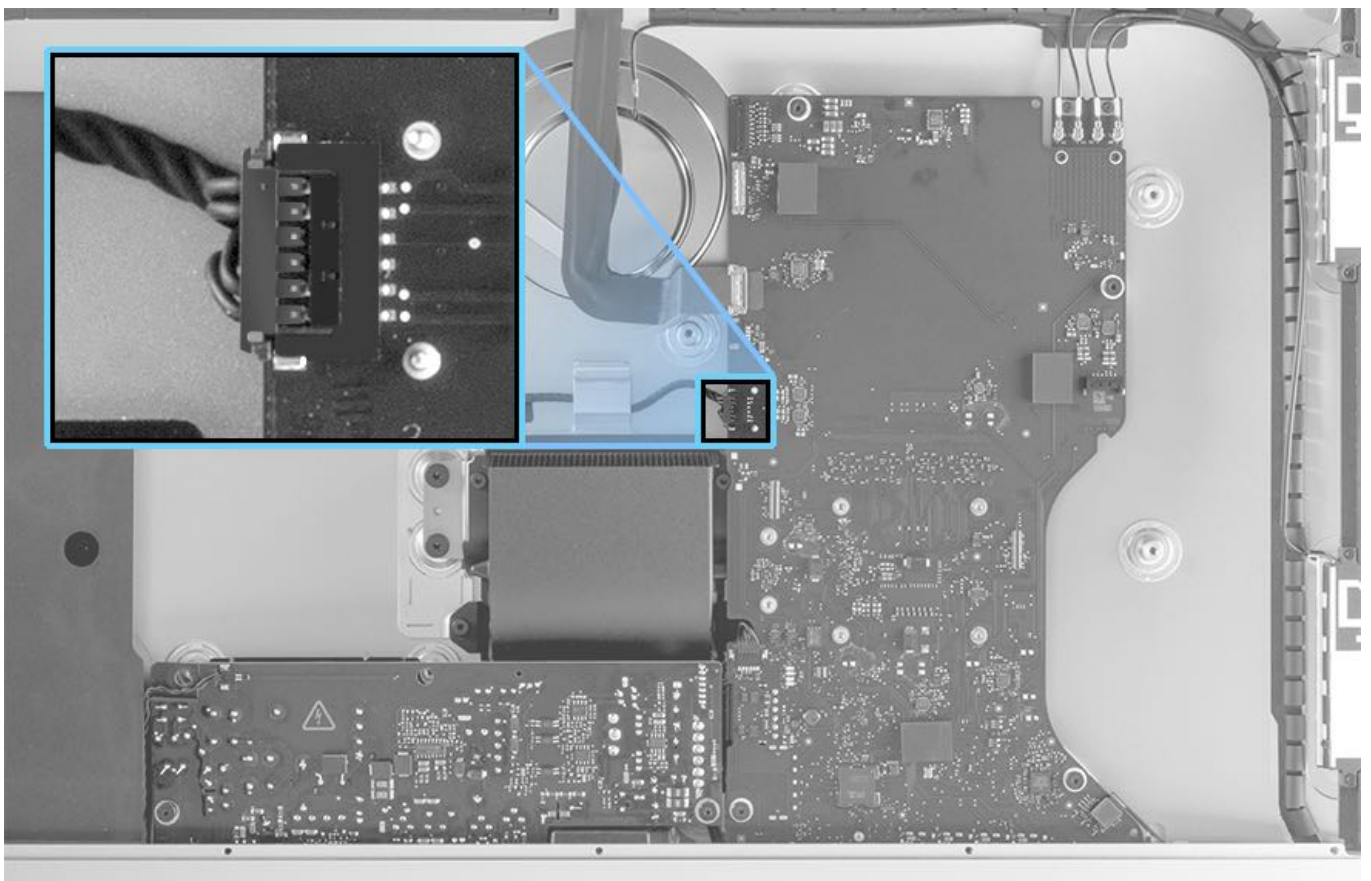
If removing or replacing the wireless card, then you will also need the following tools:

- Caution:** If the power button cable breaks, then the rear housing will need to be replaced. The power button cable is not available separately.



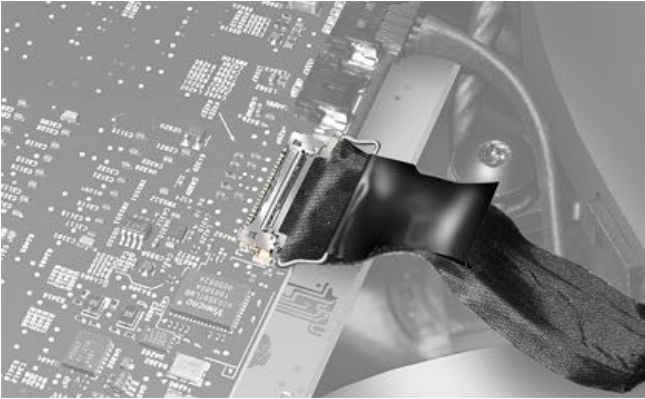
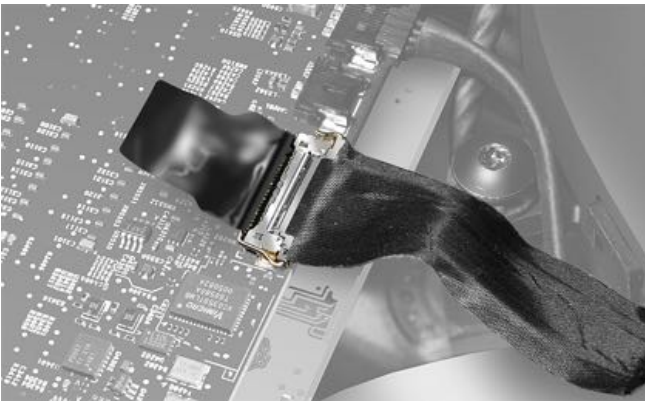
3. Disconnect the left speaker cable from the logic board.

**Caution:** Squeeze the sides of the connector while pulling the cable out, to avoid damage to the logic board. Not squeezing the sides of the connector may cause damage to the logic board receptacle, making a logic board replacement necessary.

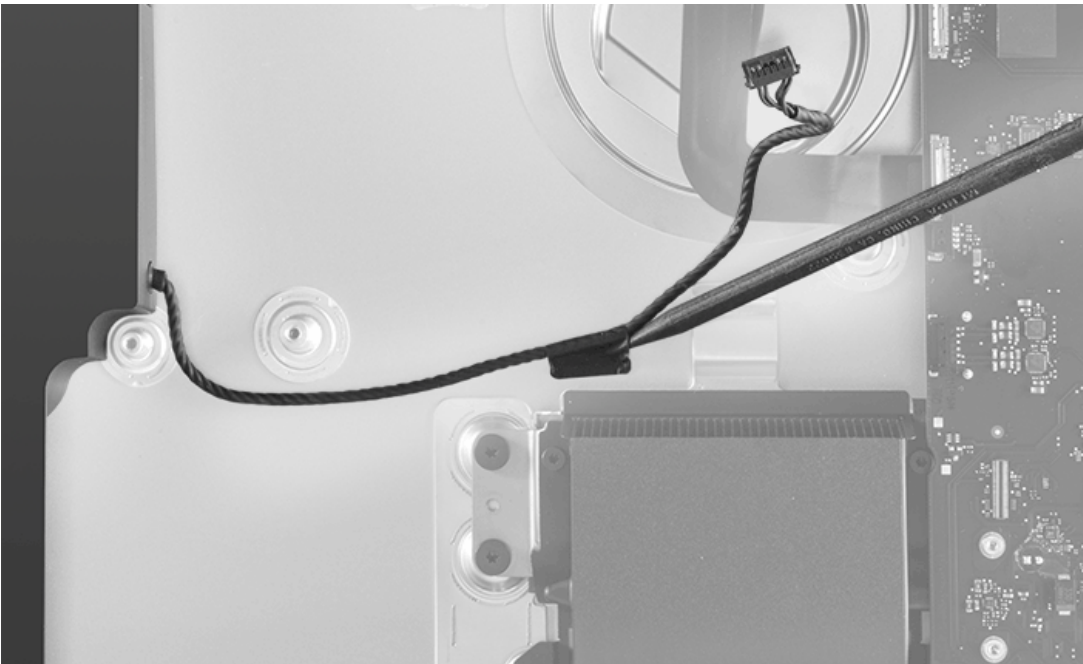


4. Disconnect the camera/microphone cable from the logic board. Flip the locking-lever bar toward the cable and pull the cable straight out of the connector.



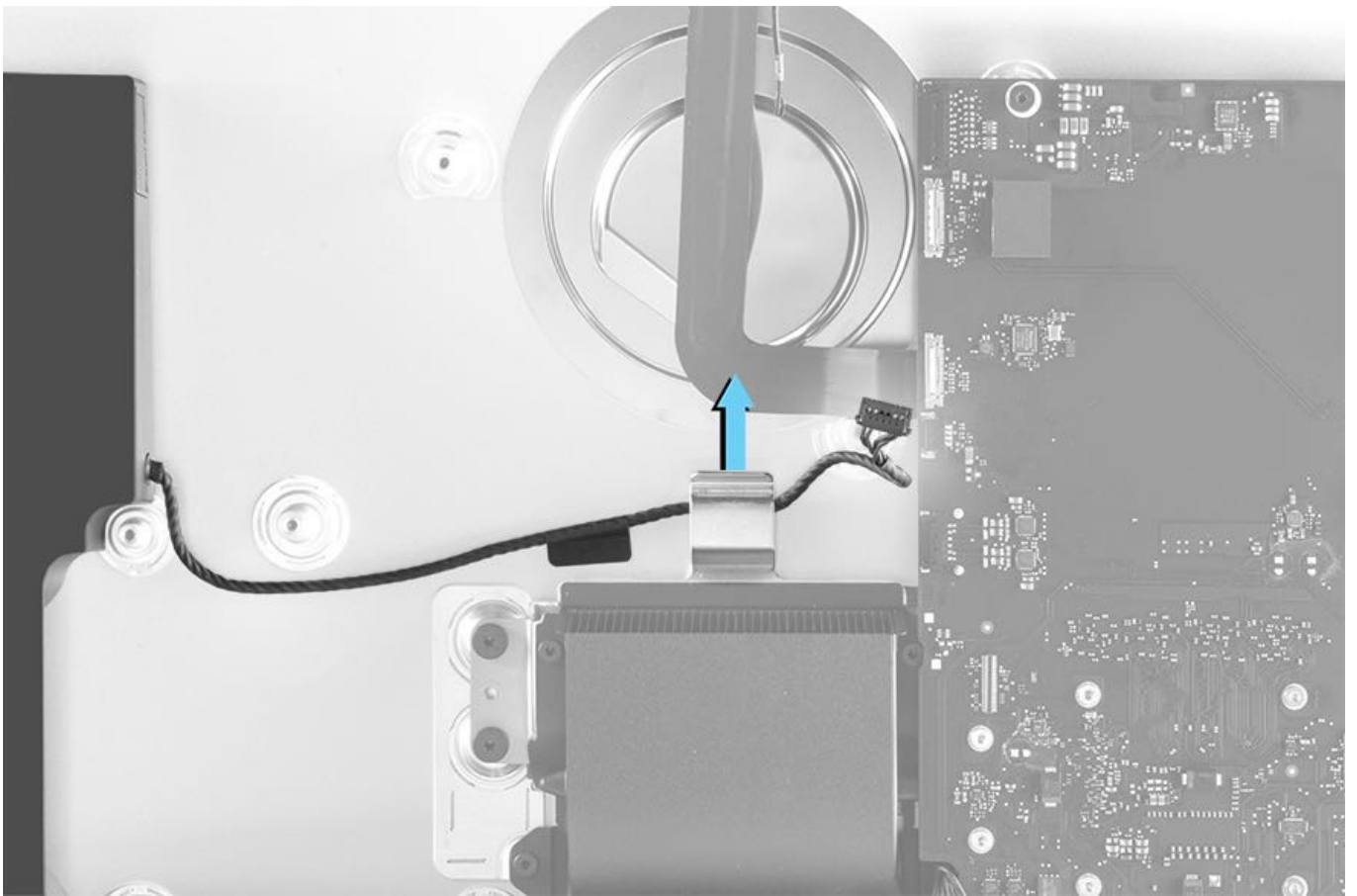


5. Loosen the tape that adheres the hard drive combo cable to the rear housing.

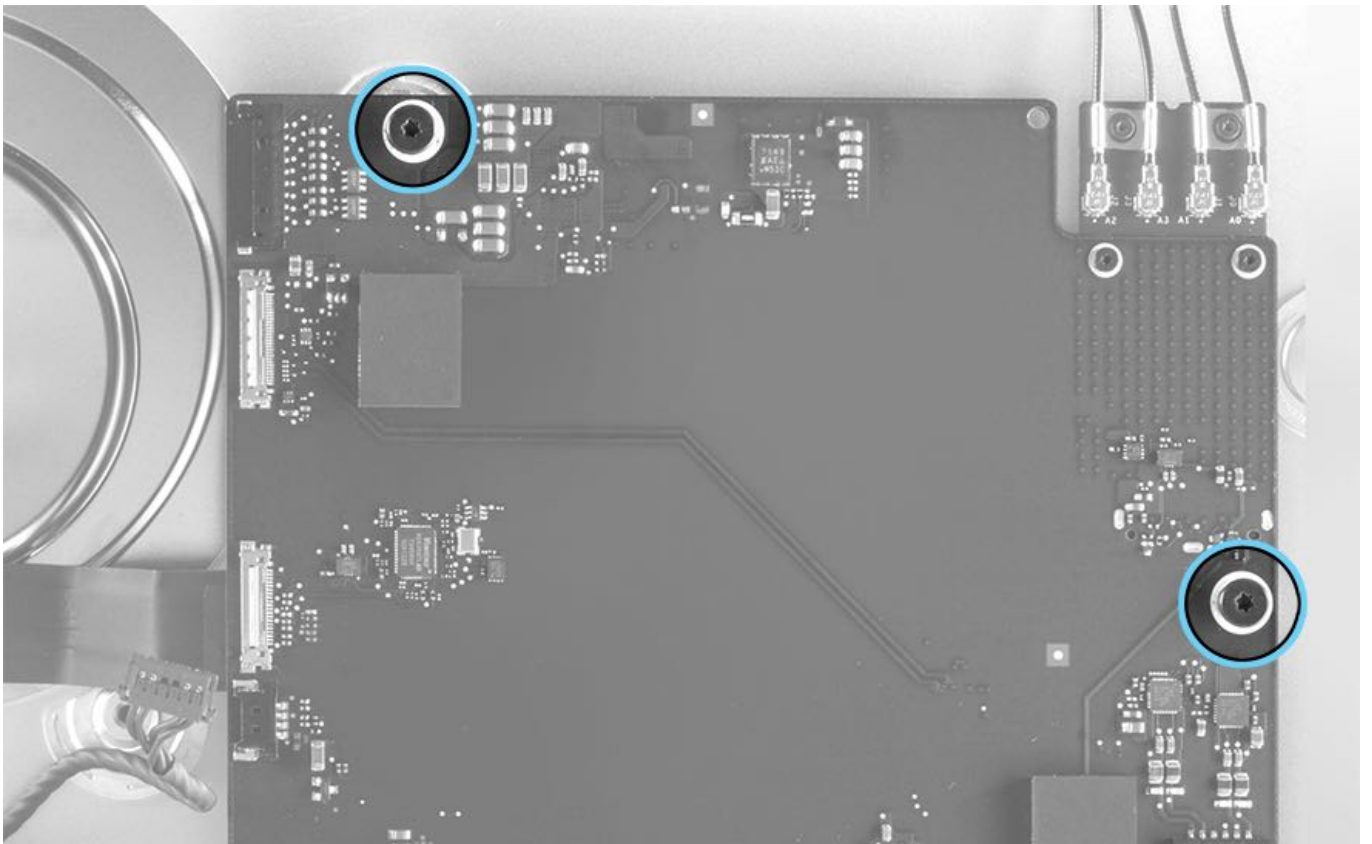


6. Remove the hard drive combo cable from the clip.



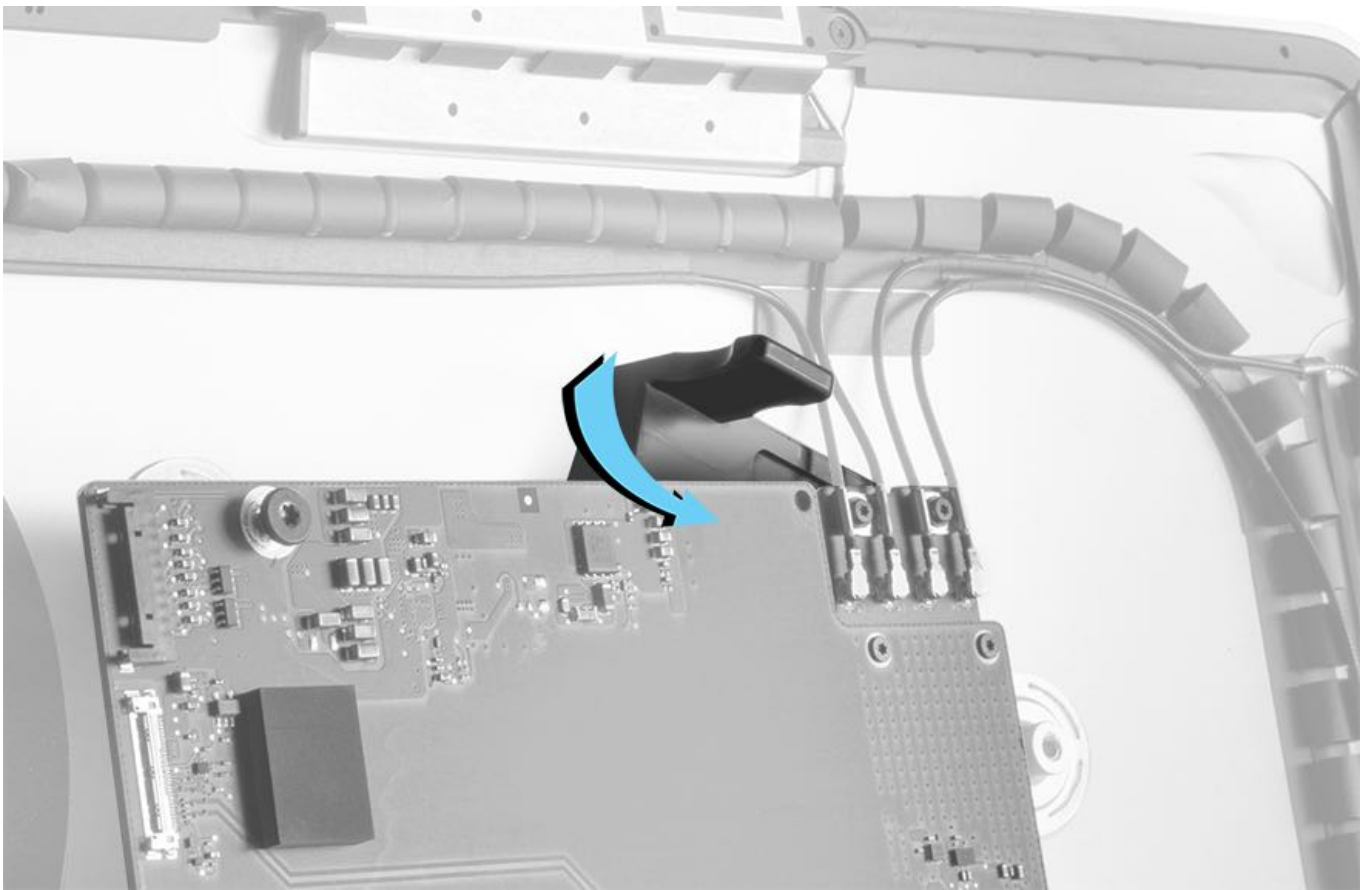


7. Loosen the top two T8 screws from the logic board.



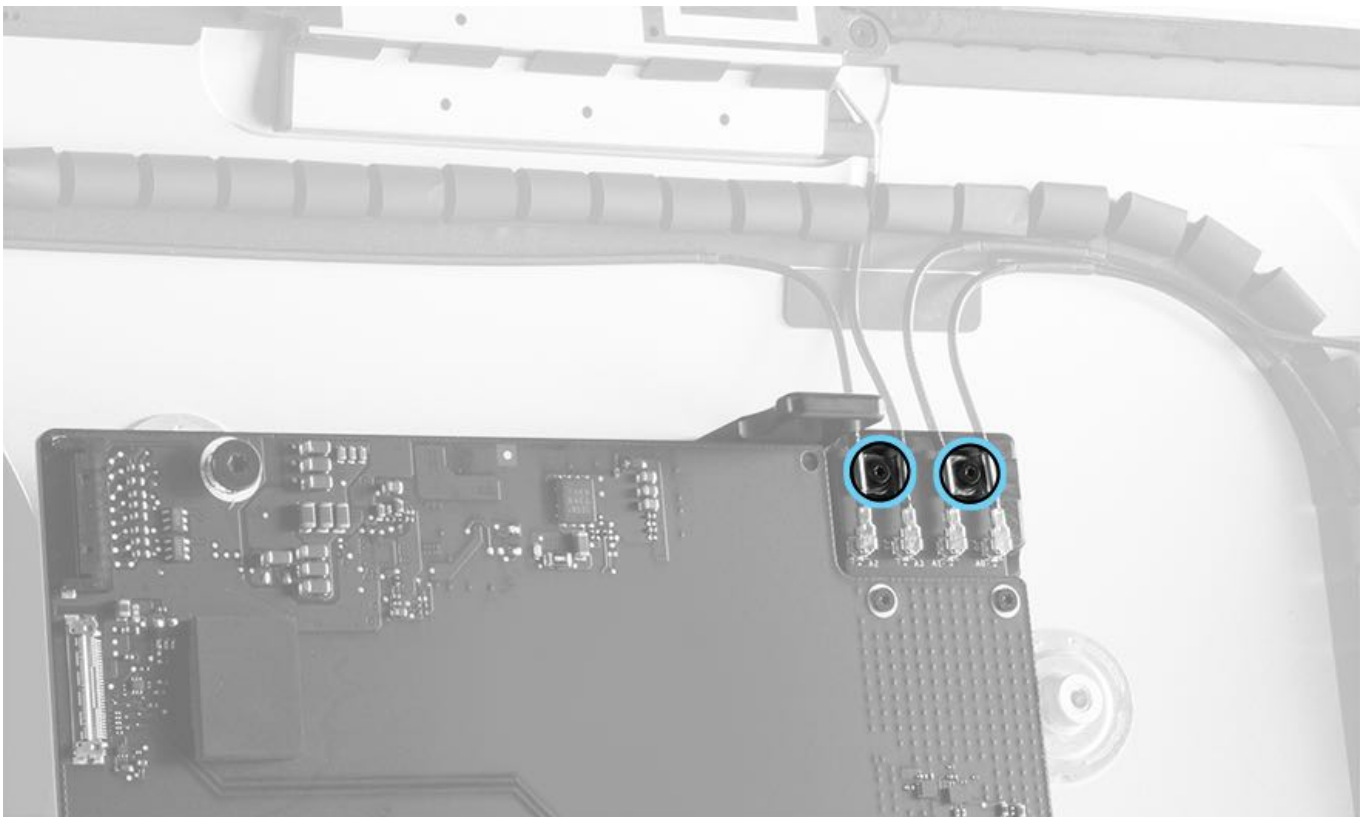
8. Before disconnecting the Wi-Fi and Bluetooth antenna cables, slide the wireless card support tool into place between the rear housing and the wireless card.

**Note:** Always keep the support tool in position while removing or replacing screws and disconnecting or reconnecting antenna cables.



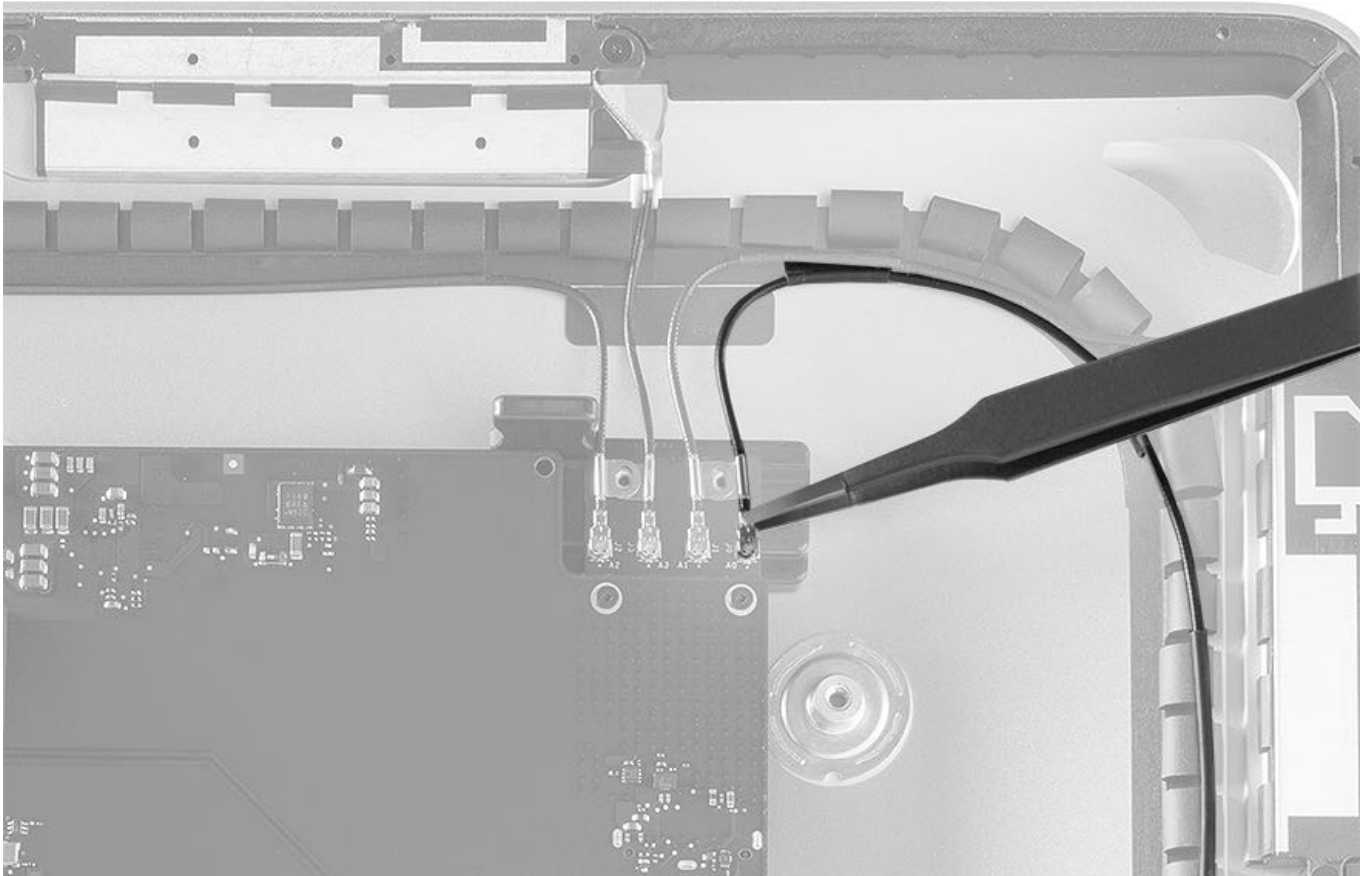
9. Remove the two screws from the brackets that hold the antennas in place.

- T5: (923-00609)



10. Use ESD-safe tweezers to disconnect the antennas.

**Caution:** When using metal tweezers, be careful not to crimp or damage the antenna.



11. Remove the support tool from the rear housing.

12. Remove four screws from the logic board.

- T8: 7.2mm (923-0331)

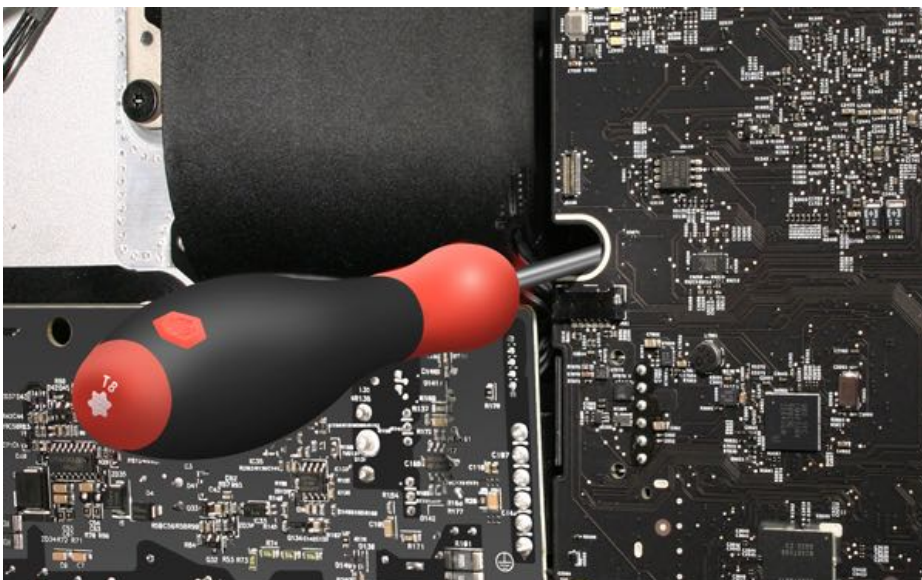
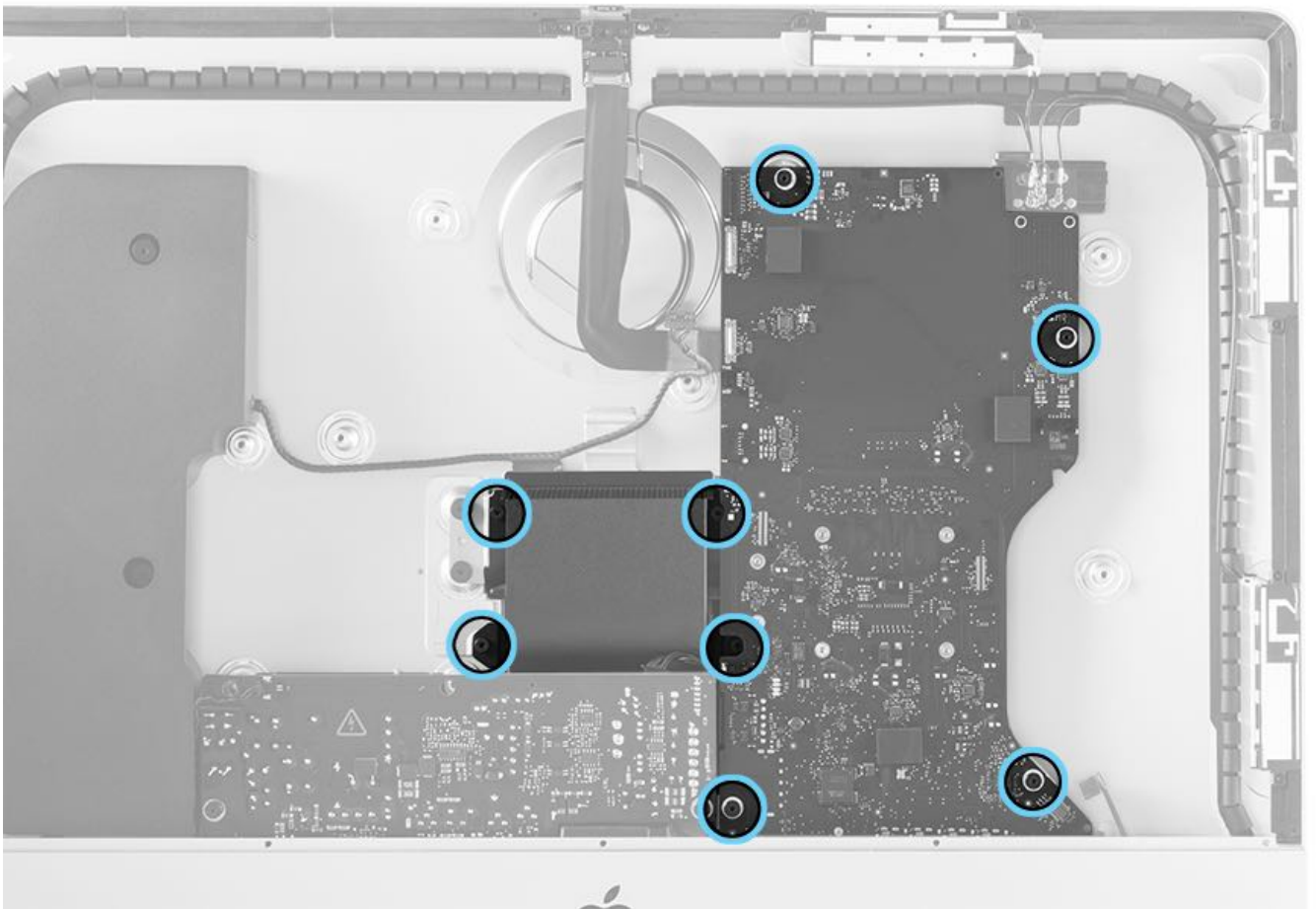


13. Remove four screws from the heat sink:

- T8: Two longer screws (923-0327) on the upper finstack
- T8: Two shorter screws (923-0336) on the lower finstack

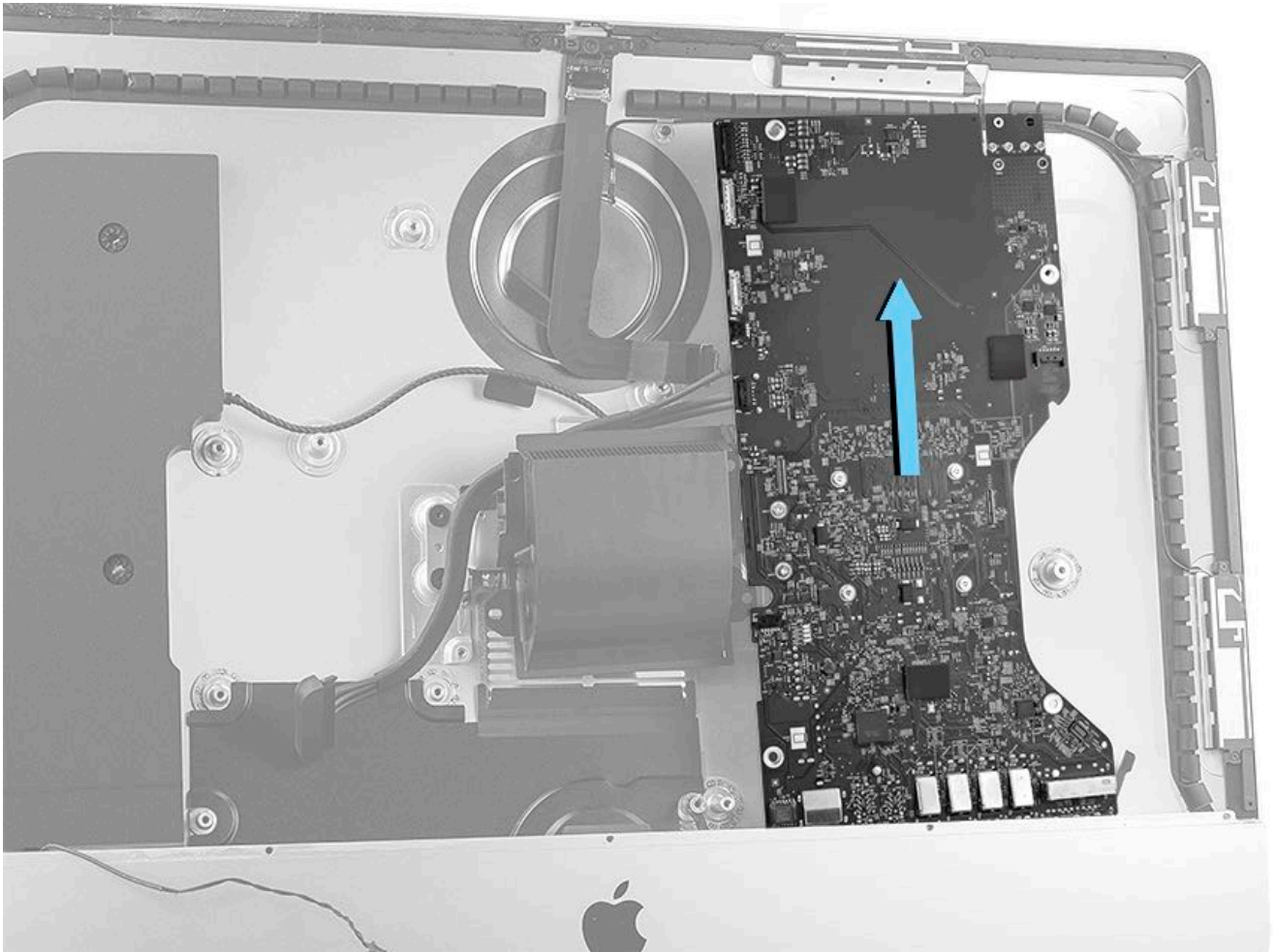
**Tip:** Lay the computer down when removing the heat sink screws so they do not fall into the chin well.





14. Carefully pull the logic board up and partly out of the chin. The logic board is still attached to the power supply.

**Caution:** Be careful to not scratch the chin.



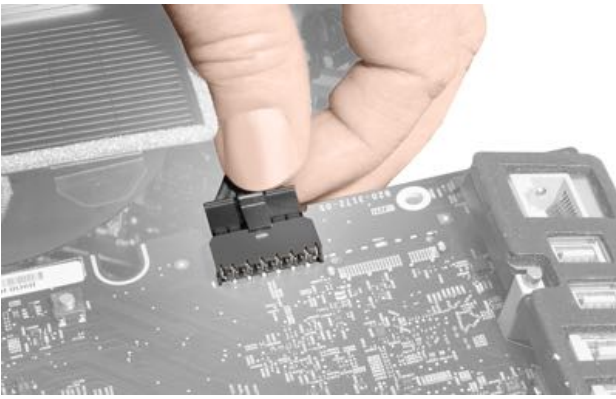
15. Disconnect the power supply signal cable and the DC power cable.

**Power supply signal cable:**



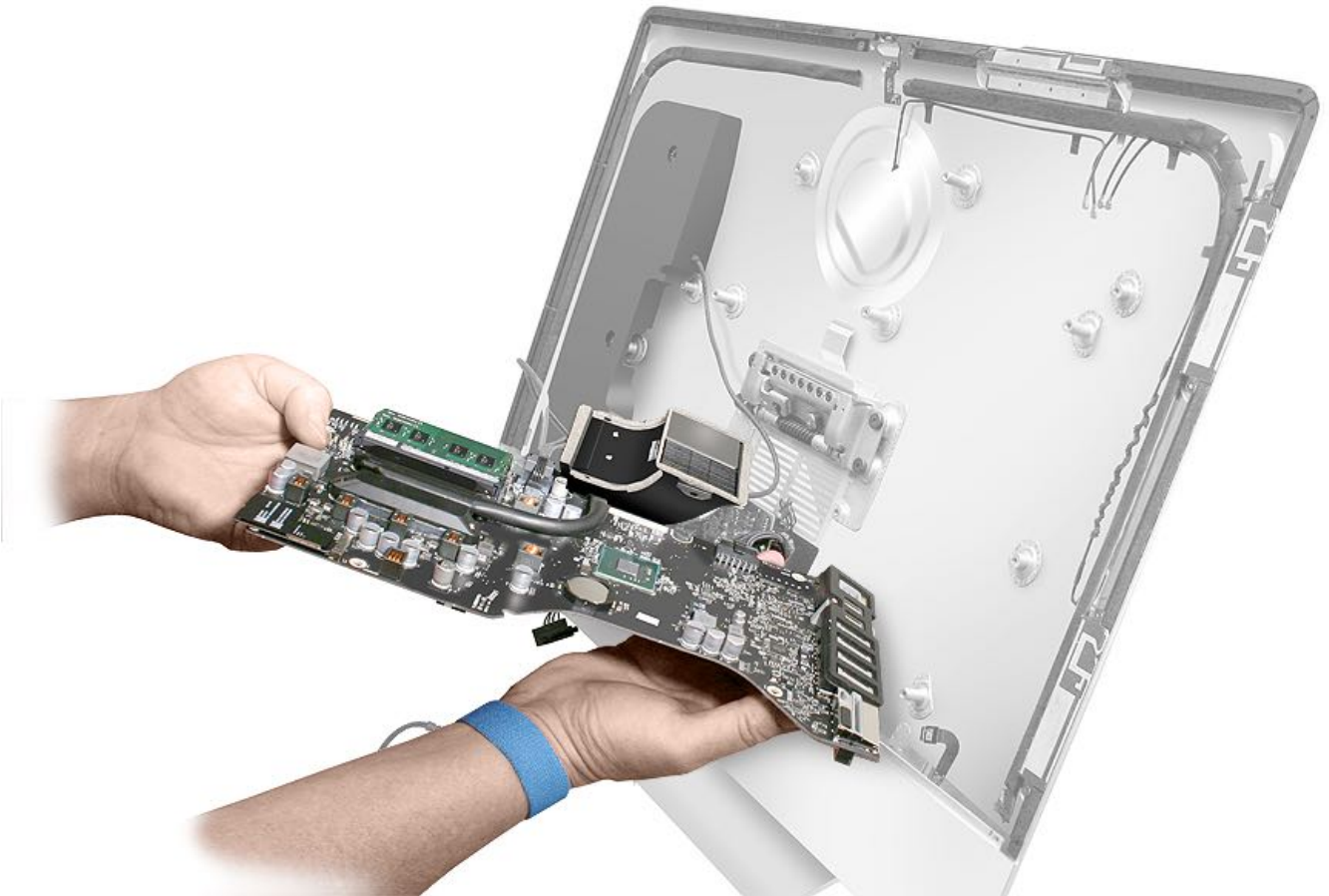
**DC power cable:**





16. Carefully remove the logic board from the rear housing.

17. Verify that the tamper indicator labels on the heat sink are intact. If the labels have been removed or tampered with, then the logic board is not eligible for exchange.

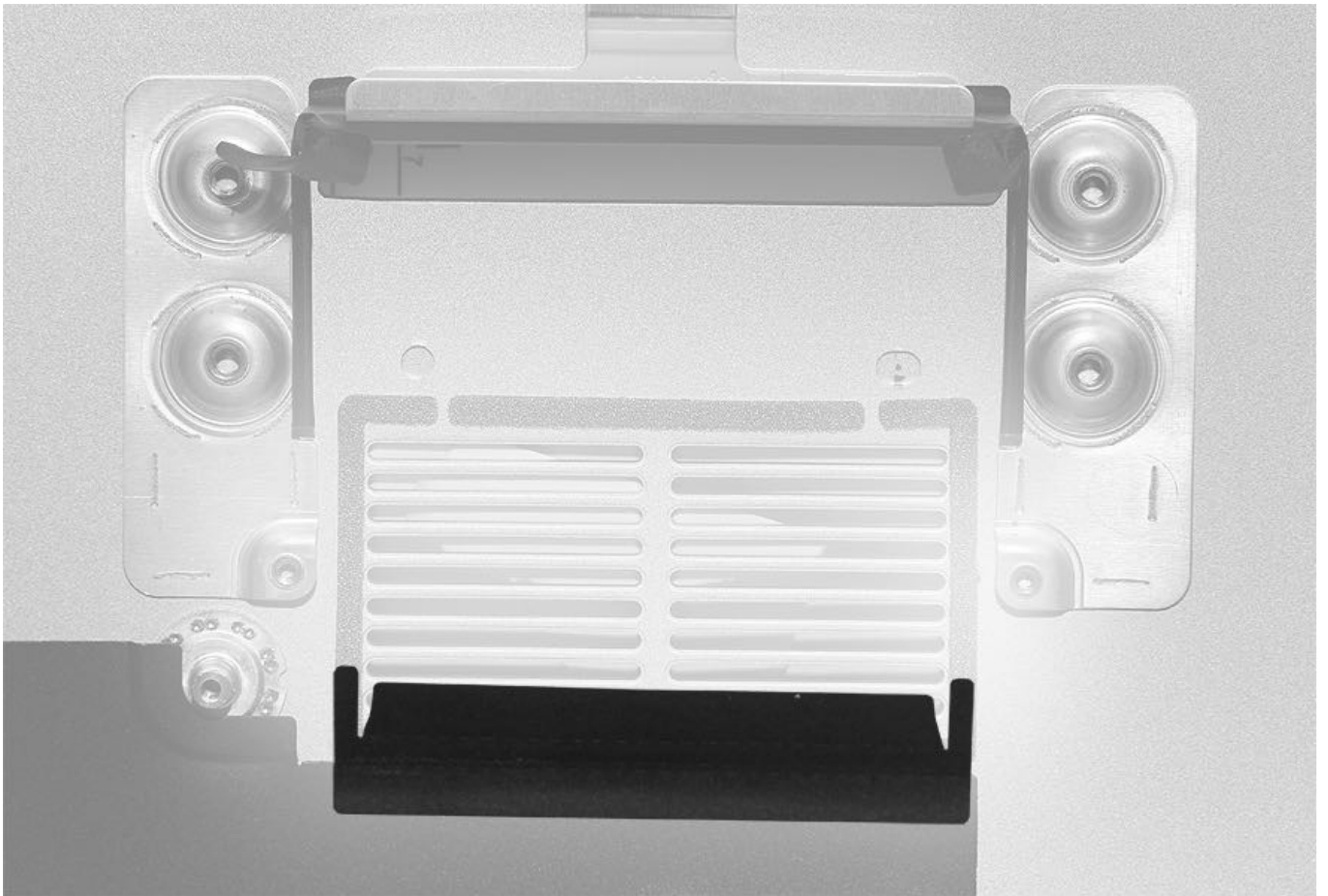


## Steps For Reassembly

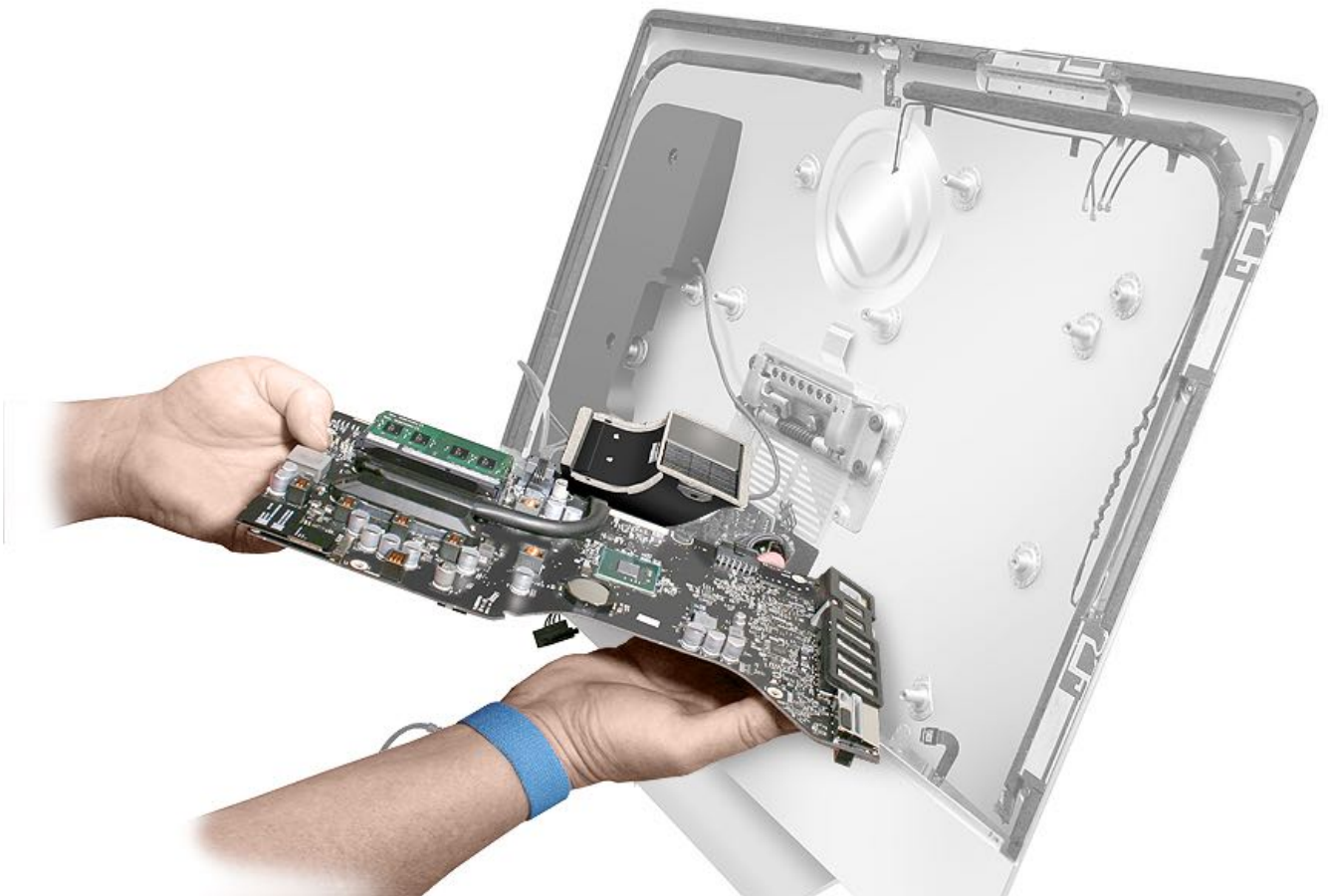
1. If installing a new logic board, then transfer these parts from the old logic board:

- flash storage (if present)
- wireless card
- hard drive combo cable

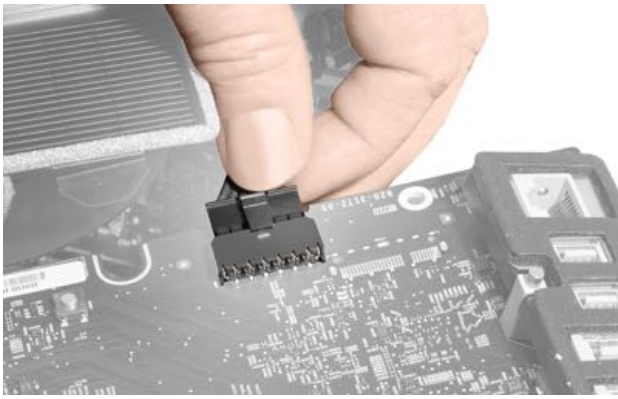
2. Ensure that the insulator is attached to the rear housing before inserting the logic board into the chin.



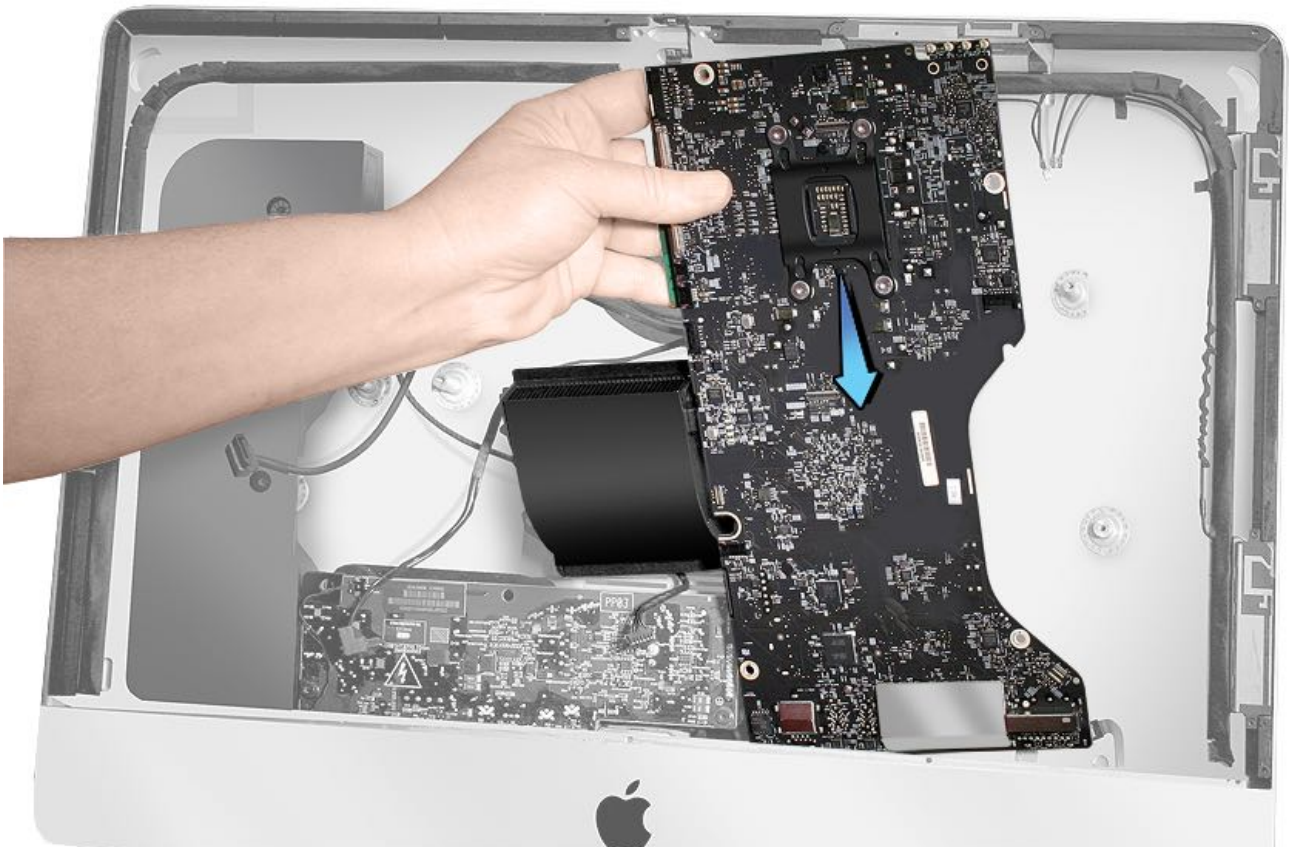
3. Insert the logic board partway into the chin.



4. Connect the power supply power cable to the back side of the logic board. **Note:** Ensure that the power button cable is tucked into the channel on the left speaker and is not loose under the power supply.



5. Set the logic board down into the chin area. There are two pins on the I/O connectors that insert into blind holes in the rear housing. Move the logic board with small movements and listen for the pins to click into place.



6. Once the I/O pins are in place, press the logic board down so the I/O gasket does not push the pins out.

7. Loosely install two screws at the bottom of the logic board first, so you can stop holding the board down.

- T8: 7.2mm (923-0331)

8. Loosely install the two remaining screws to the logic board. **Do not** tighten them down yet.

- T8: 7.2mm (923-0331)



**Tip:** Lay the computer down when installing the heat sink screws so they do not fall into the chin well.

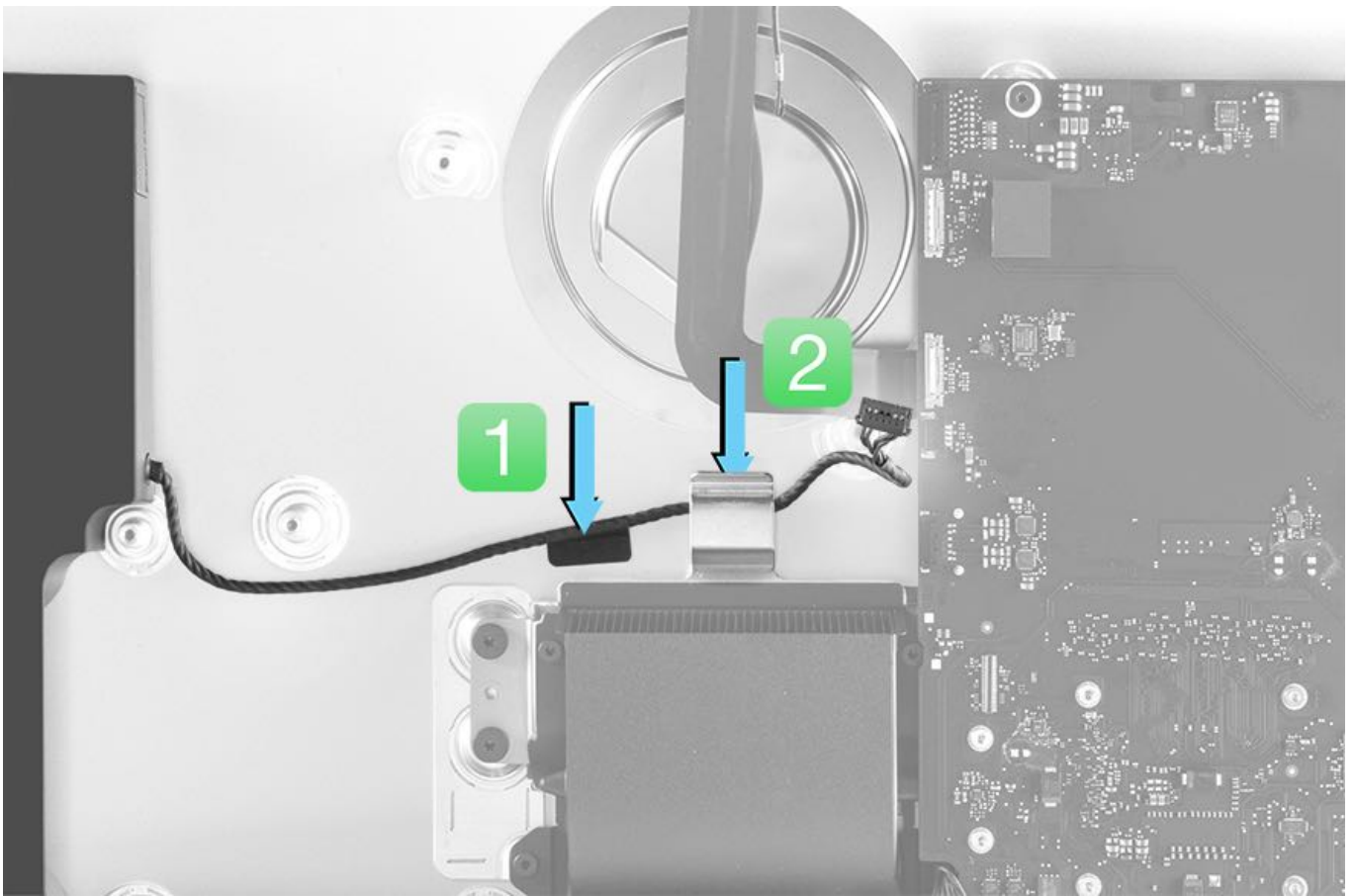
9. Install four screws to the heat sink:



- T8: two longer screws (923-0327) on upper finstack
- T8: two shorter screws (923-0336) on lower finstack



10. Place the hard drive combo cable into the clip (2), adhere the black tape to the rear assembly (1), and reconnect the cable to the logic board. **Note:** Leave some slack on the hard drive data cable on the logic board side.

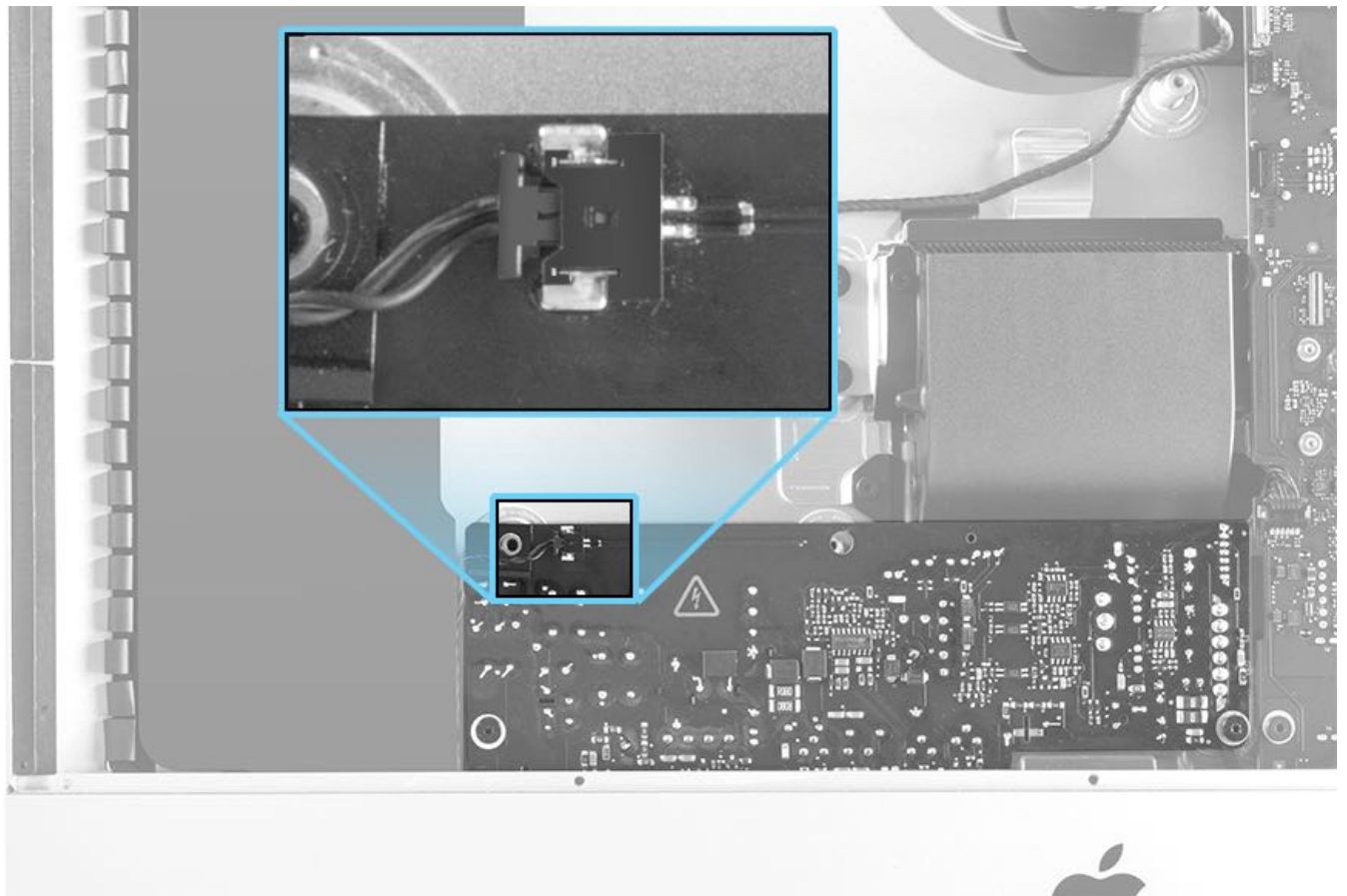


11. Connect the power supply data cable to the front of the logic board. **Note:** Check that the power button cable is tucked into the channel on the left speaker.

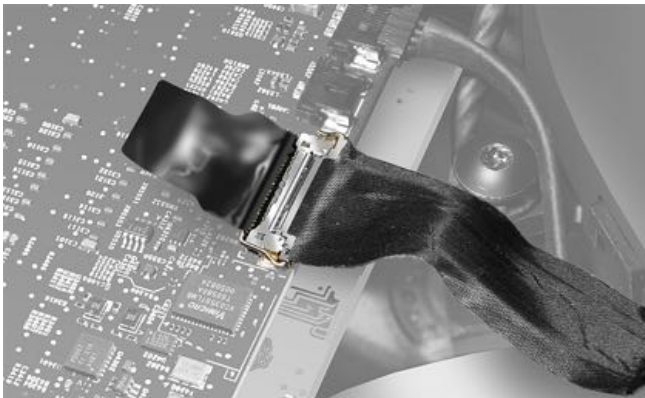


12. Connect the power button cable to the power supply.



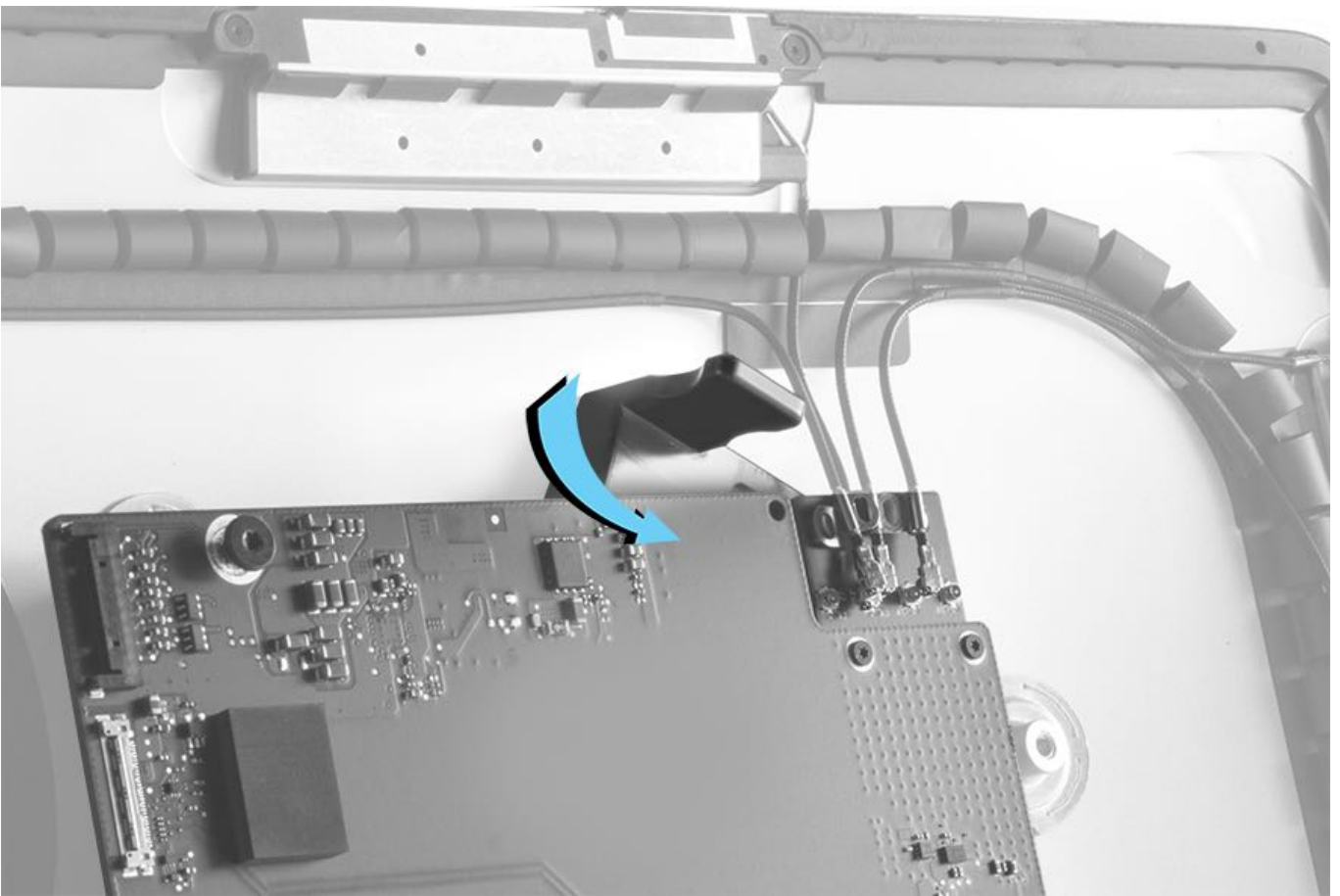


13. Connect the camera/microphone cable to the logic board. Insert the cable straight into the connector and flip the locking-lever bar toward the logic board. Press around the bar to secure the cable.



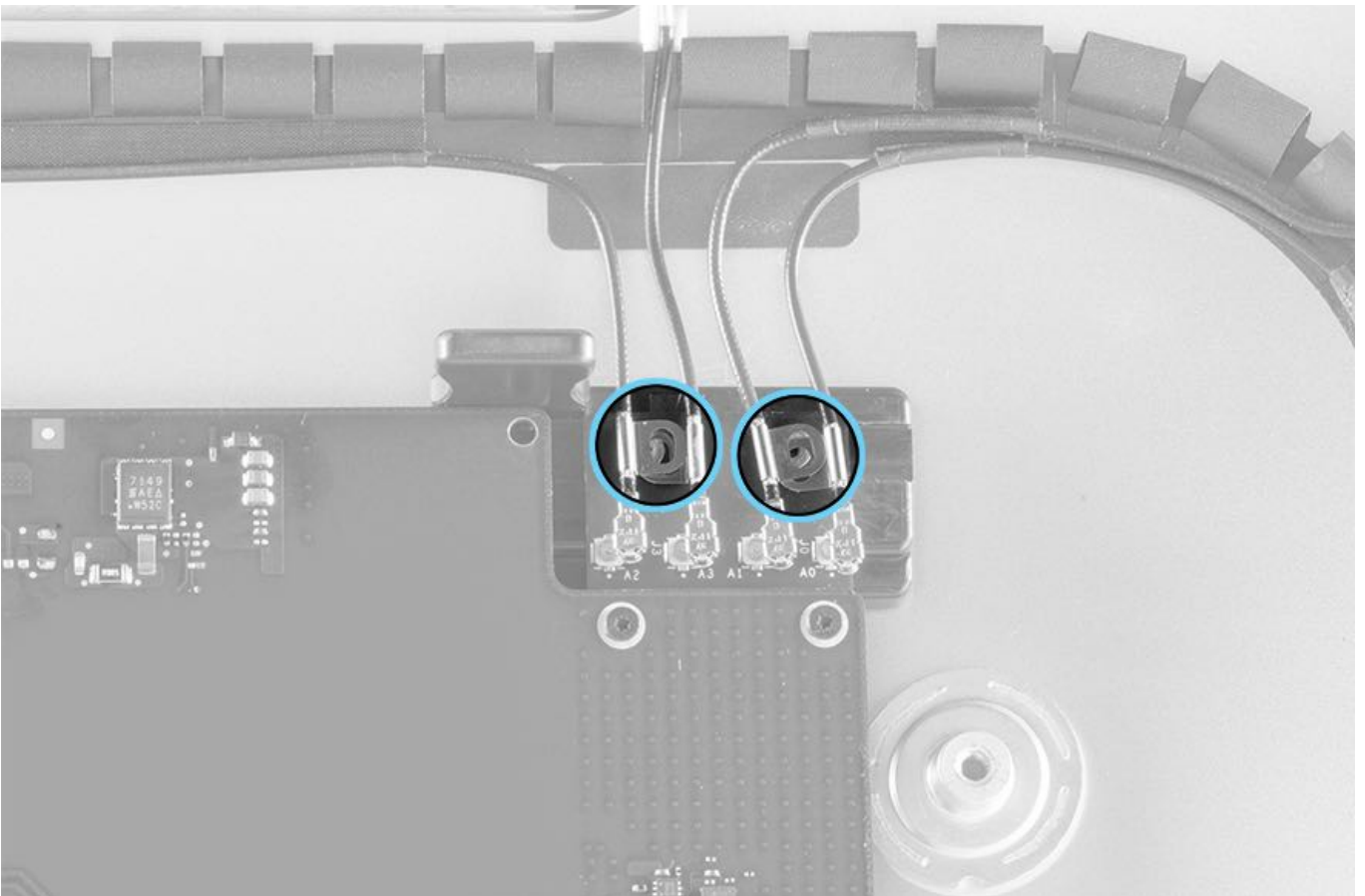
14. Connect the left speaker cable to logic board.

15. Before reconnecting the antenna cables, slide the wireless card support tool into place between the rear housing and the wireless card. **Note:** Keep the support tool in position while removing or replacing screws and disconnecting or reconnecting antenna cables.

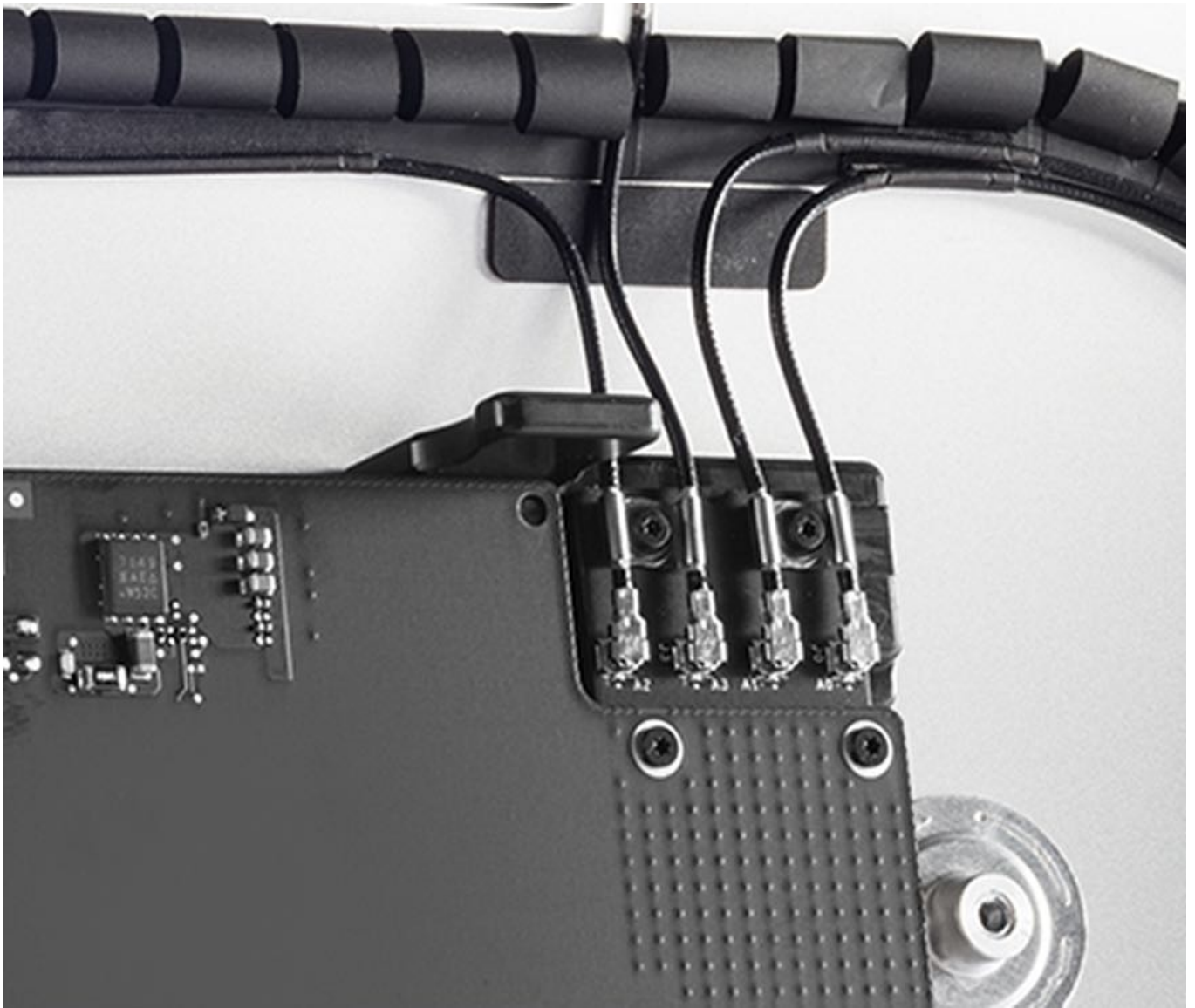


16. Reinstall two screws. **Note:** When replacing the screws, be sure to place the brackets left over right.

- T5: (923-00609)

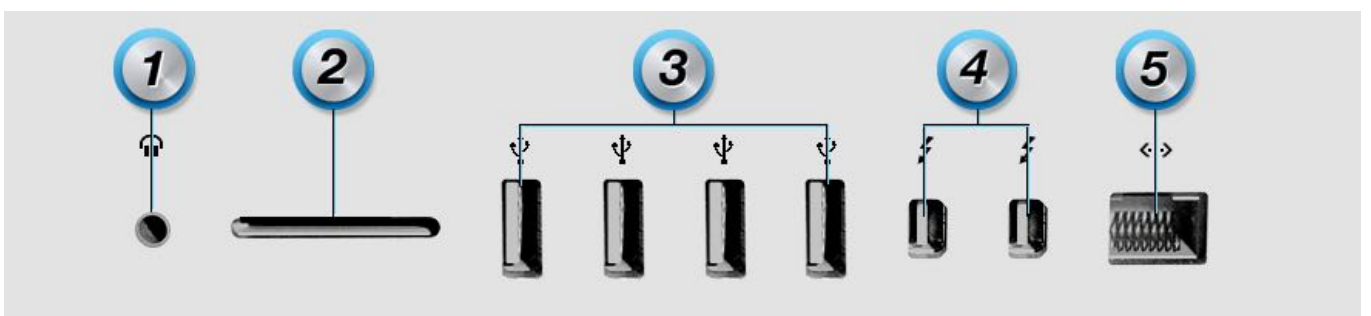


17. Reconnect the four antenna cables to the wireless card.



18. Remove the support tool from the rear housing.

19. To ensure correct logic board alignment with rear housing, plug in an SD card (#2), one USB cable (#3), and two Thunderbolt cables (#4) while tightening the logic board screws.



20. Reinstall the [left speaker](#).

21. Reinstall the [chin strap](#).

22. Reinstall the [hard drive cradle](#).

23. Reinstall the [hard drive](#).

24. Reinstall the [hard drive brackets](#).

25. Reinstall the [fan](#).

26. Install new [display panel VHB strips](#).

27. Reinstall the [display panel](#).

**If you have installed a replacement logic board:**

28. Apply a new Ethernet ID label (included in box with a replacement logic board) to the bottom of the stand.

29. Use Blank Board Serializer (BBS) to set the computer's serial number after the computer has been reassembled. BBS can be run from AST 2 or as a standalone, USB-based version found in article [SD63: Blank Board Serializer](#).

- For more information about AST 2 and supported Mac models, see article [OP476: Latest Apple Service Toolkit download links and documentation](#).
- **Important:** When using BBS in AST 2, ensure that the unit under test (UUT) and the AST server are connected to the same network, and that the AST server has the latest software version installed.



# Flash Storage

## First Steps

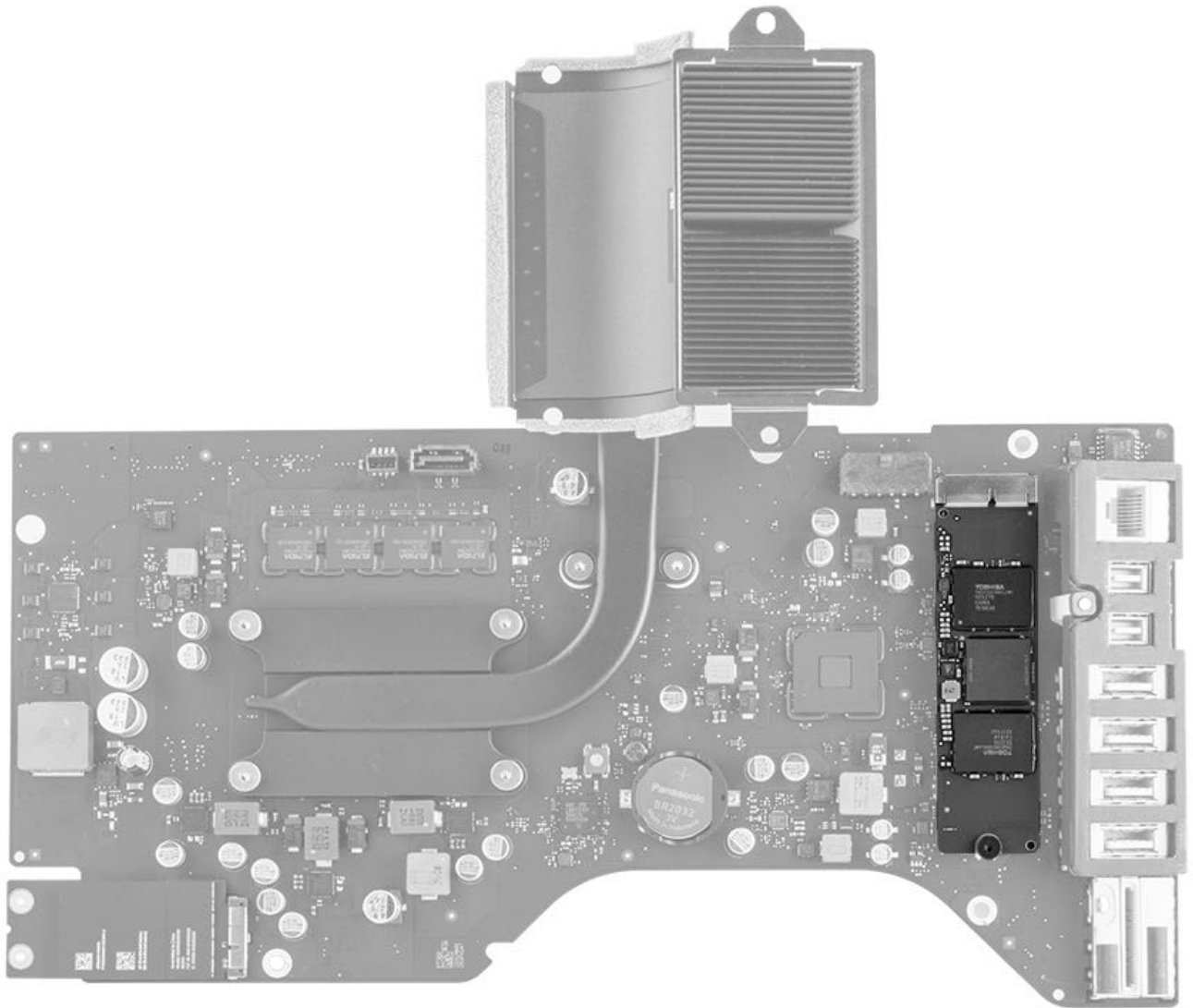
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

For video instruction, refer to article [SV240: Flash Storage Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)

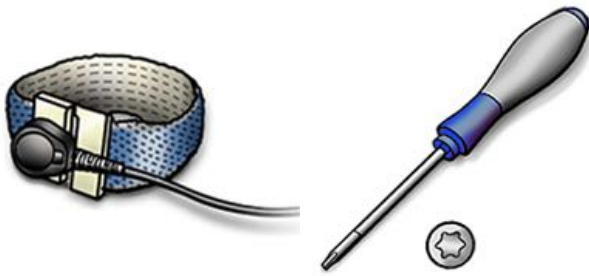
**Note:** The chin strap must be removed for this repair.



## Tools

- ESD mat and wrist strap
- Torx T8 screwdriver (magnetized)





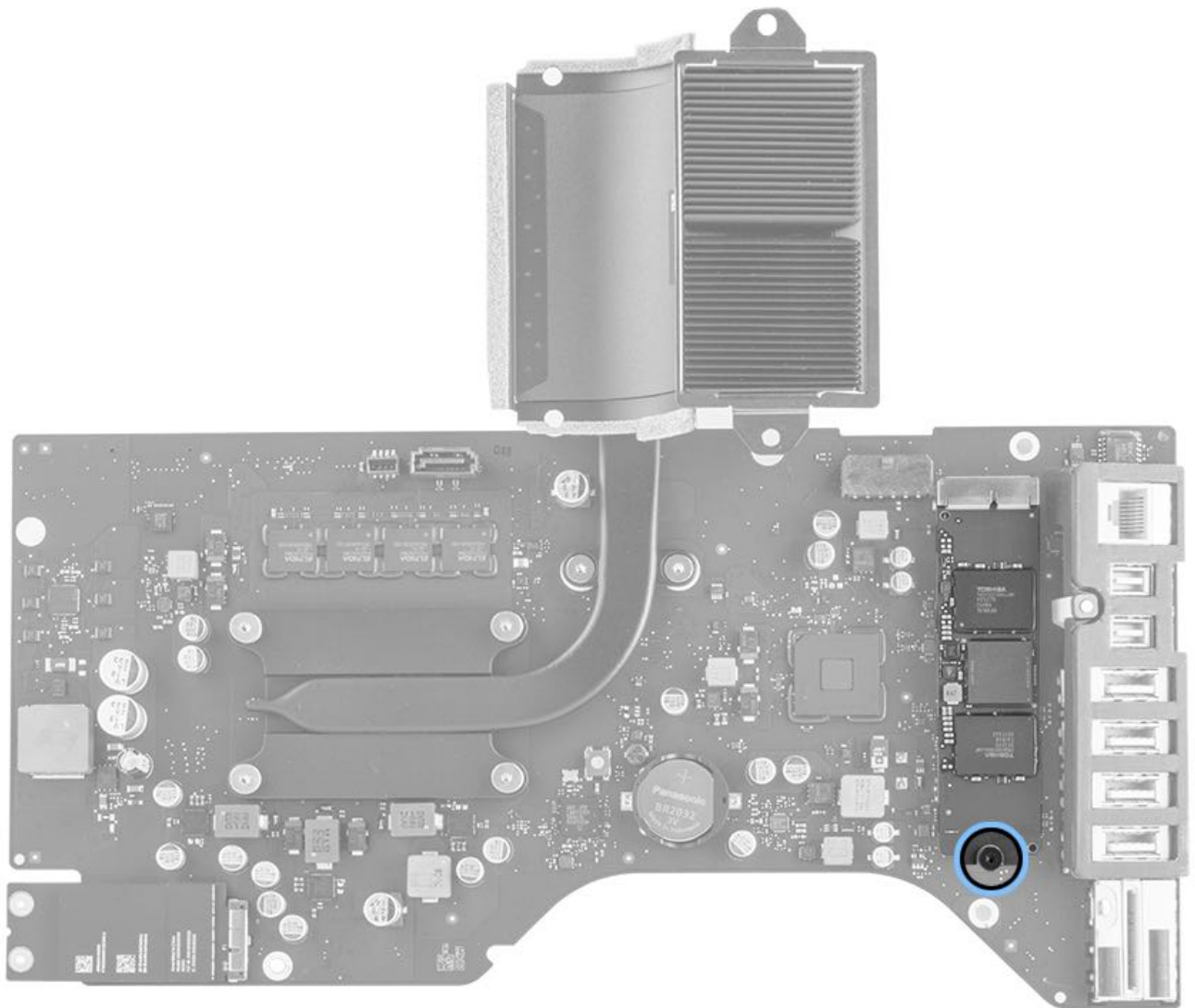
## Steps For Removal

**Note:** The flash storage is on the back of the logic board.

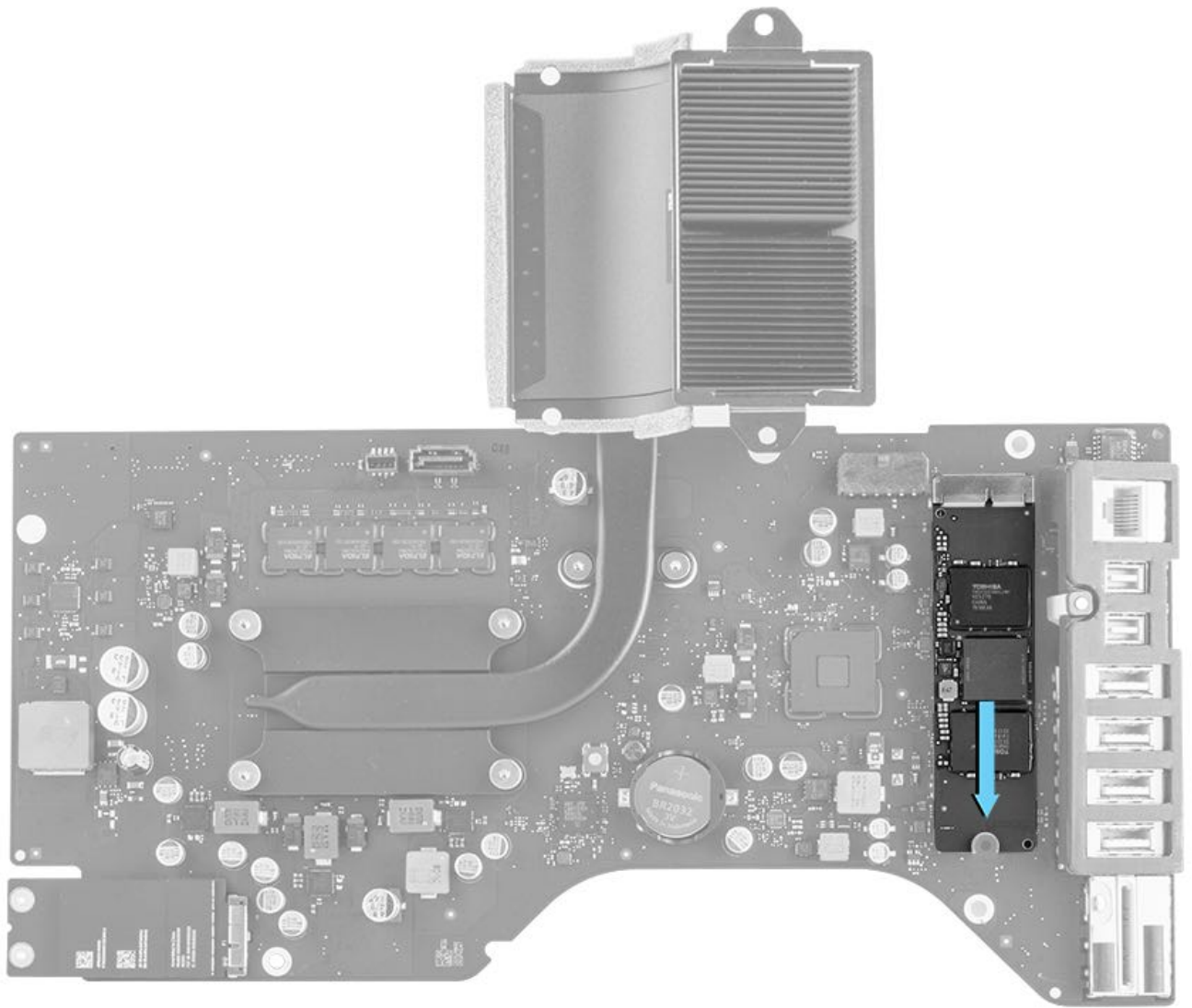
**Caution:** Ensure that data is backed up before removing the flash storage.

1. Remove one screw.

- T8, 923-0336

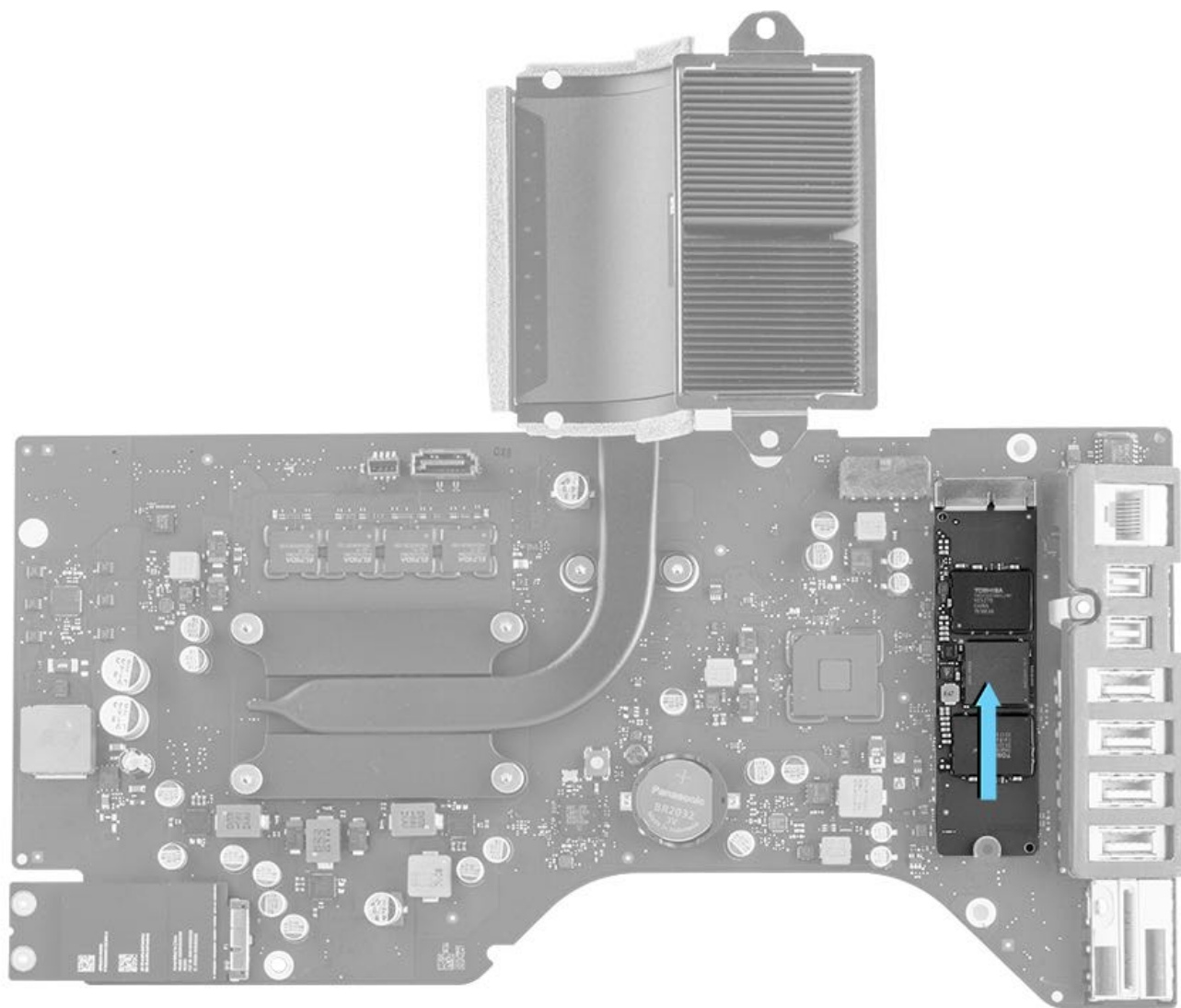


2. Pull the flash storage straight out of the connector.



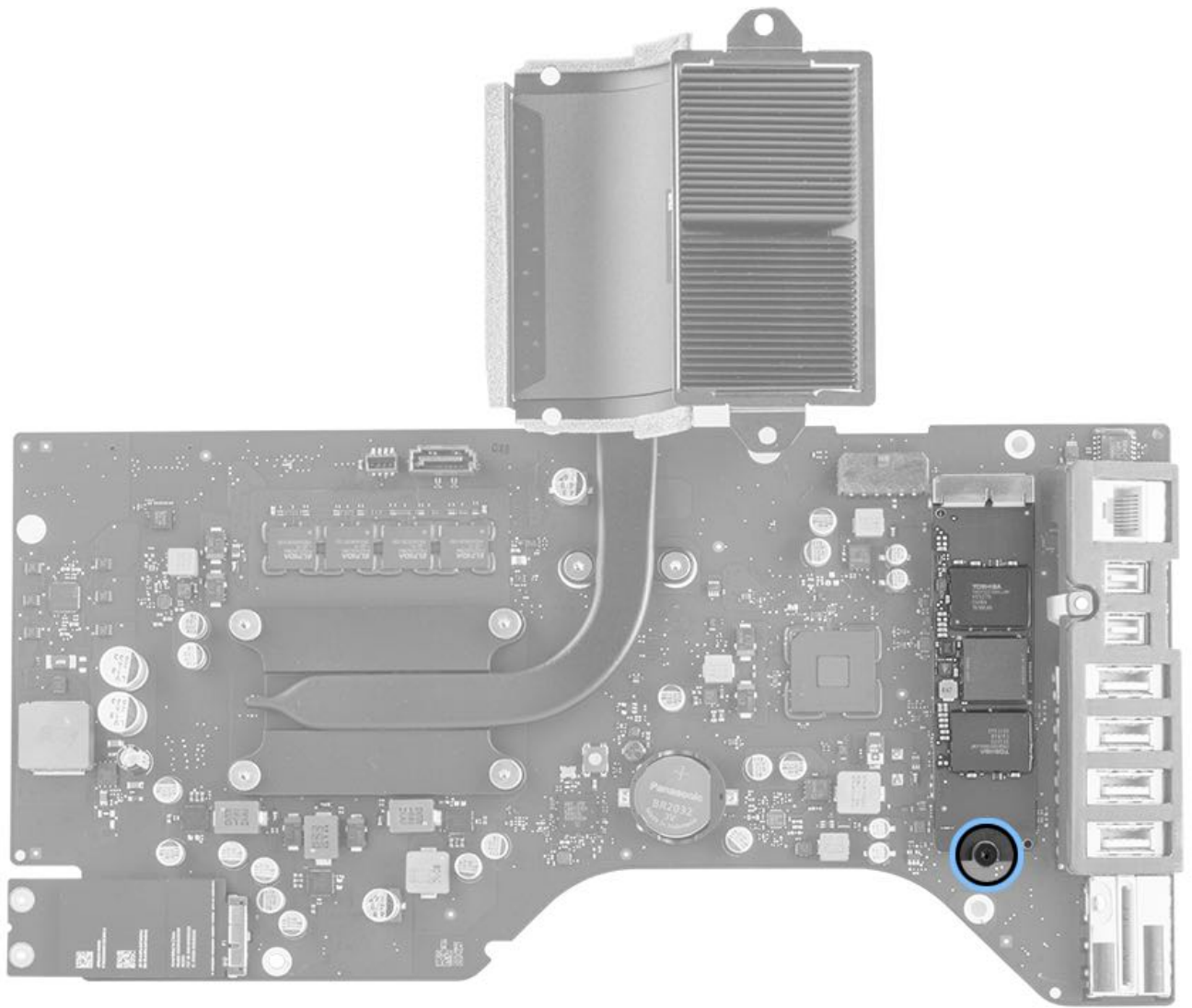
## Steps For Reassembly

1. Insert the flash storage straight into the connector on the back of the logic board.



2. Install one screw.

- T8, 923-0336



3. Reinstall the [logic board](#).
4. Reinstall the [right speaker](#).
5. Reinstall the [chin strap](#).
6. Reinstall the [hard drive cradle](#).
7. Reinstall the [hard drive](#).
8. Reinstall the [hard drive brackets](#).
9. Reinstall the [fan](#).
10. Install new [display panel VHB strips](#).
11. Reinstall the [display panel](#).
12. Refer to article [TP767: Reinstalling Software That Came with the Computer](#).

# Reinstalling Software That Came with the Computer

## Reinstalling Software That Came with the Computer

This procedure requires an Internet connection.

**Note:** In some situations, a user may have set a firmware password via a feature such as Find My Mac or FileVault. The user must know the firmware password in order to reinstall OS X or macOS. If the user cannot remember the password, then refer to the technician instructions in article [HT203409: If you lost or forgot your firmware password](#).

**Important:** Apple recommends that users back up their data before any software restore procedure. Back up essential files before installing OS X or macOS. Apple is not responsible for any loss of data.

1. Choose Apple menu > Restart, then hold down the Command (⌘) and R keys while the computer restarts.  
**Note:** To force OS X Lion or later, or macOS Sierra, into Internet Recovery, press and hold the Command-Option-R key combination while starting up the computer.
2. If the computer is not connected to the Internet, choose a network from the Wi-Fi menu (in the top-right corner of the screen).
3. Select "Reinstall OS X" (or macOS), then click Continue.
4. Follow the onscreen instructions. In the pane where you select a disk, select your current OS X or macOS disk (in most cases, it is the only one available).
5. To start the installation, click Install.

Check for and apply the latest software and firmware updates.

For more information, refer to article [HT201314: About macOS Recovery](#).



# Wireless Card

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

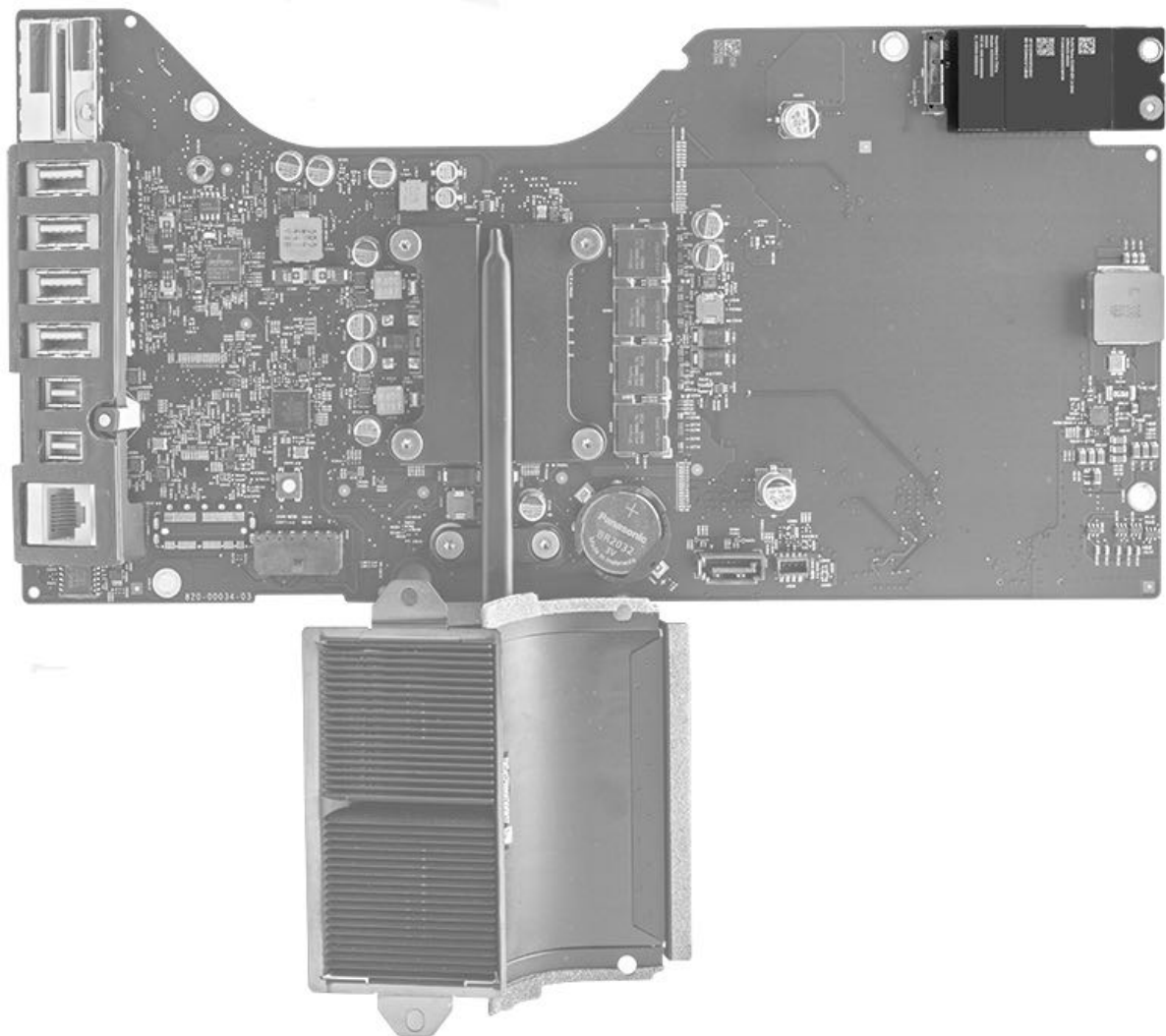
For video instruction, refer to article [SV297: Wireless Card Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Loosen power supply](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)

**Note:** The chin strap must be removed for this repair.

**Caution:** Do not remove the wireless card without taking out the logic board. Attempting wireless card removal is likely to damage both the wireless card and the logic board. Additionally, the use of thermal material during installation will make inserting the card problematic without logic board removal.

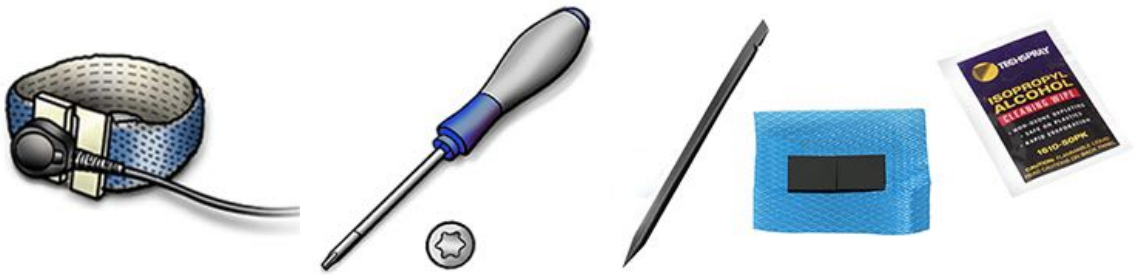


## Tools

- ESD wrist strap
- Torx T4 screwdriver (magnetized)
- Black stick

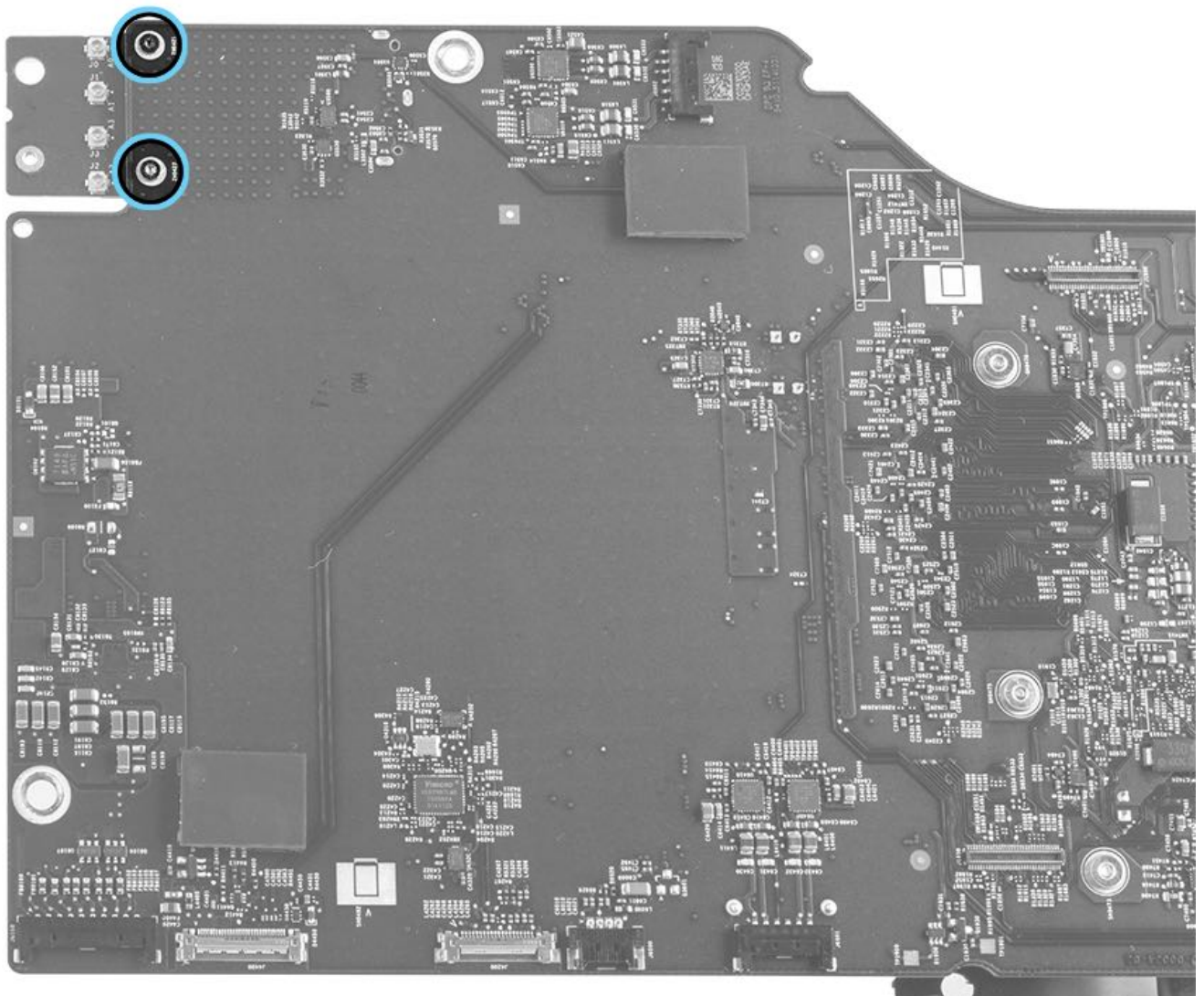
- Thermal pad kit (076-1445)
- Isopropyl alcohol (IPA) wipes

**Note:** The thermal pad kit (076-1445) includes one or more thermal pads. Whenever you remove or replace the wireless card, check the condition of the thermal pad on the wireless card. If the thermal pad is degraded, remove the original thermal pad, clean the area with an IPA wipe, and install one thermal pad to the wireless card.



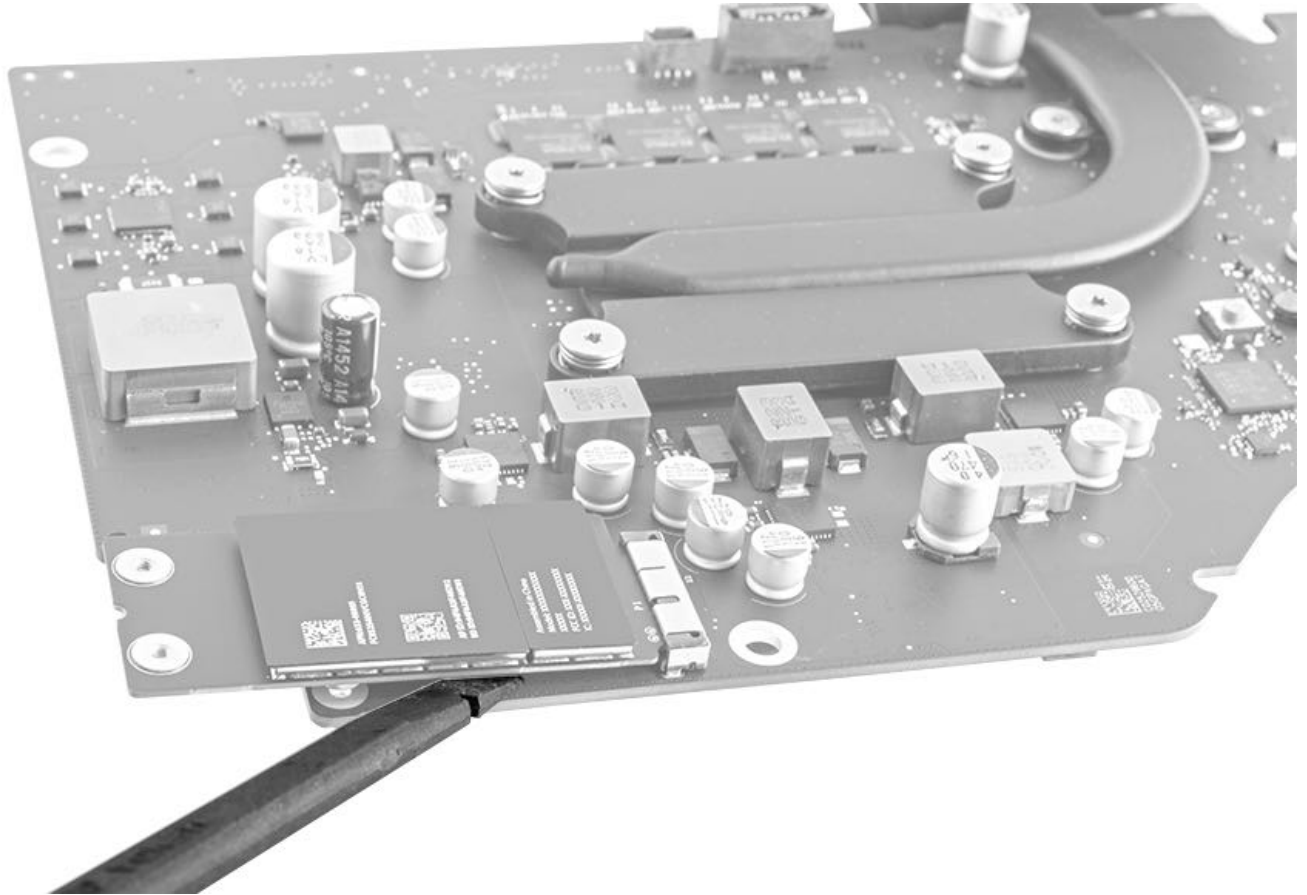
## Steps For Removal

1. Remove the two T4 screws (923-00571) that secure the wireless card to the logic board.



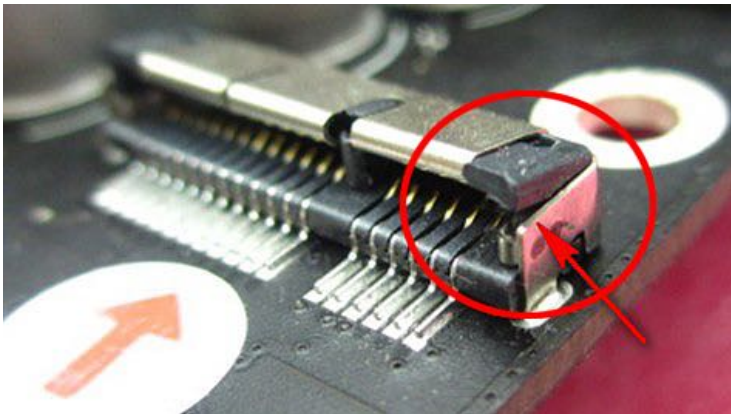
2. Use a black stick to gently loosen the bond of thermal material between the logic board and the wireless card. **Caution:**

Exerting too much force when trying to loosen the bond can damage the wireless card connector (see step 3).



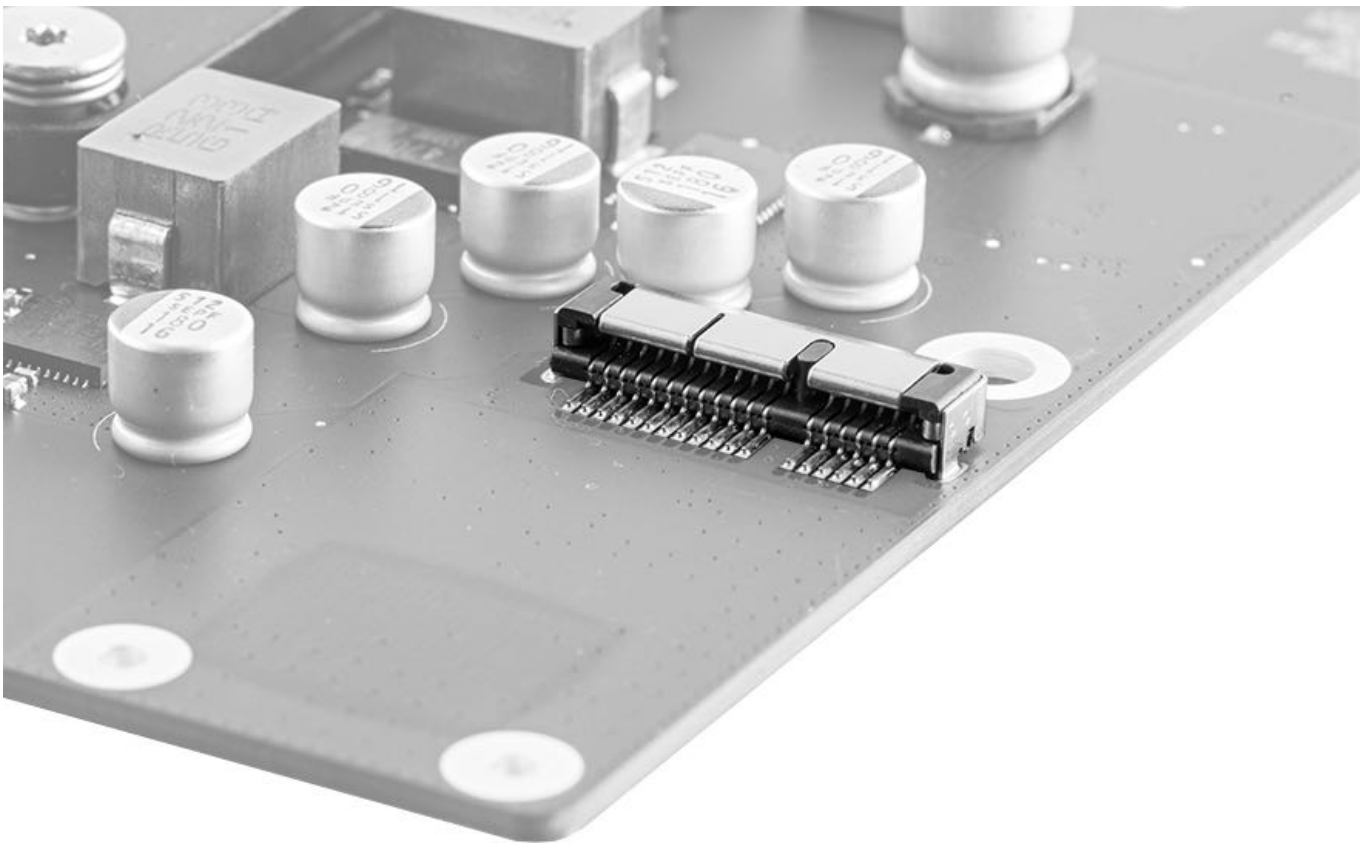
3. **Important:** A damaged wireless card connector requires a logic board replacement.

#### Damaged Wireless Card Connector

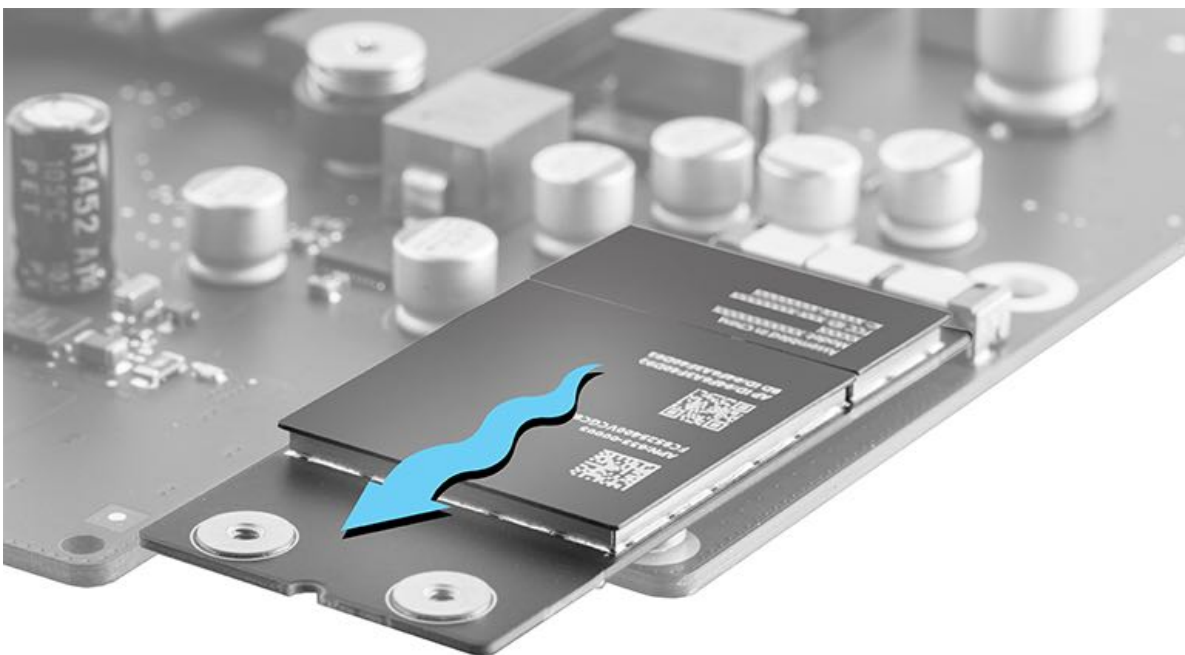


#### Wireless Card Connector Without Damage





4. **Gently** wiggle the wireless card out of the wireless card connector on the logic board.



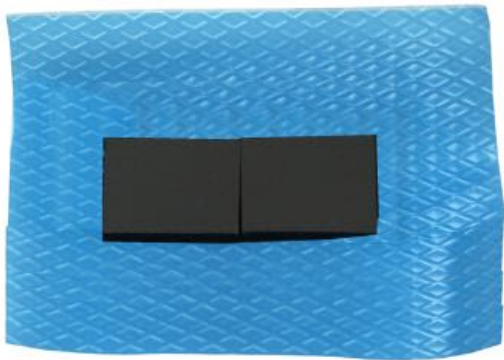
5. If thermal material is present, then use an IPA wipe to carefully remove the thermal material from both the logic board and the wireless card. Harsh scraping can damage delicate circuitry.

### Steps For Reassembly

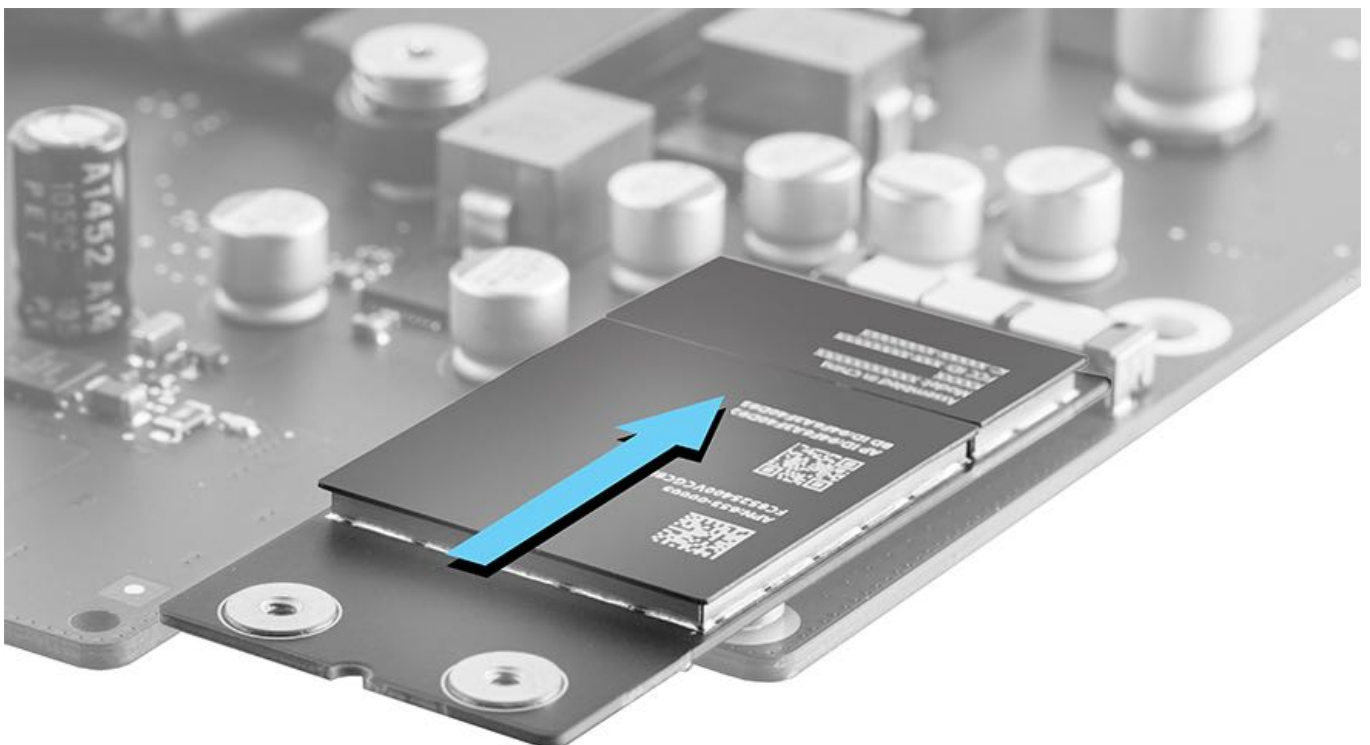
1. Check the condition of the thermal pad on the replacement wireless card. A damaged thermal pad shows uneven borders or lost adhesion.



2. If a new thermal pad is required, then use one from the thermal pad kit (076-1445) to attach to the wireless card.

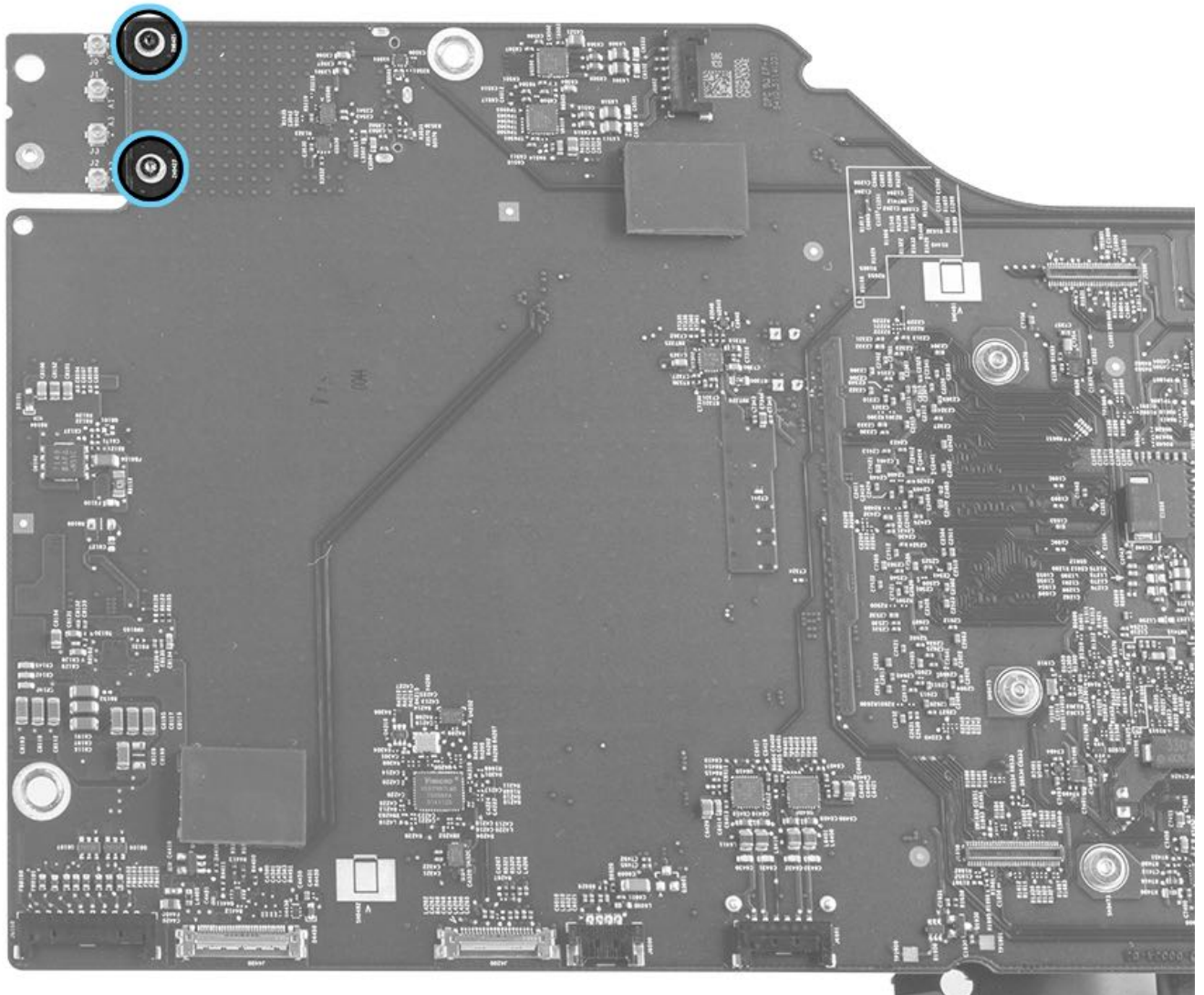


3. Hold the wireless card by the edges and slide it into the connector on the logic board.





4. Turn over the logic board and install the two T4 (923-00571) screws.



5. Reinstall the [logic board](#).
6. Reinstall the [right speaker](#).
7. Reinstall the [chin strap](#).
8. Reinstall the [hard drive cradle](#).
9. Tighten the [power supply](#).
10. Reinstall the [hard drive](#).
11. Reinstall the [hard drive brackets](#).
12. Reinstall the [fan](#).
13. Install new [display panel VHB strips](#).
14. Reinstall the [display panel](#).

# Battery

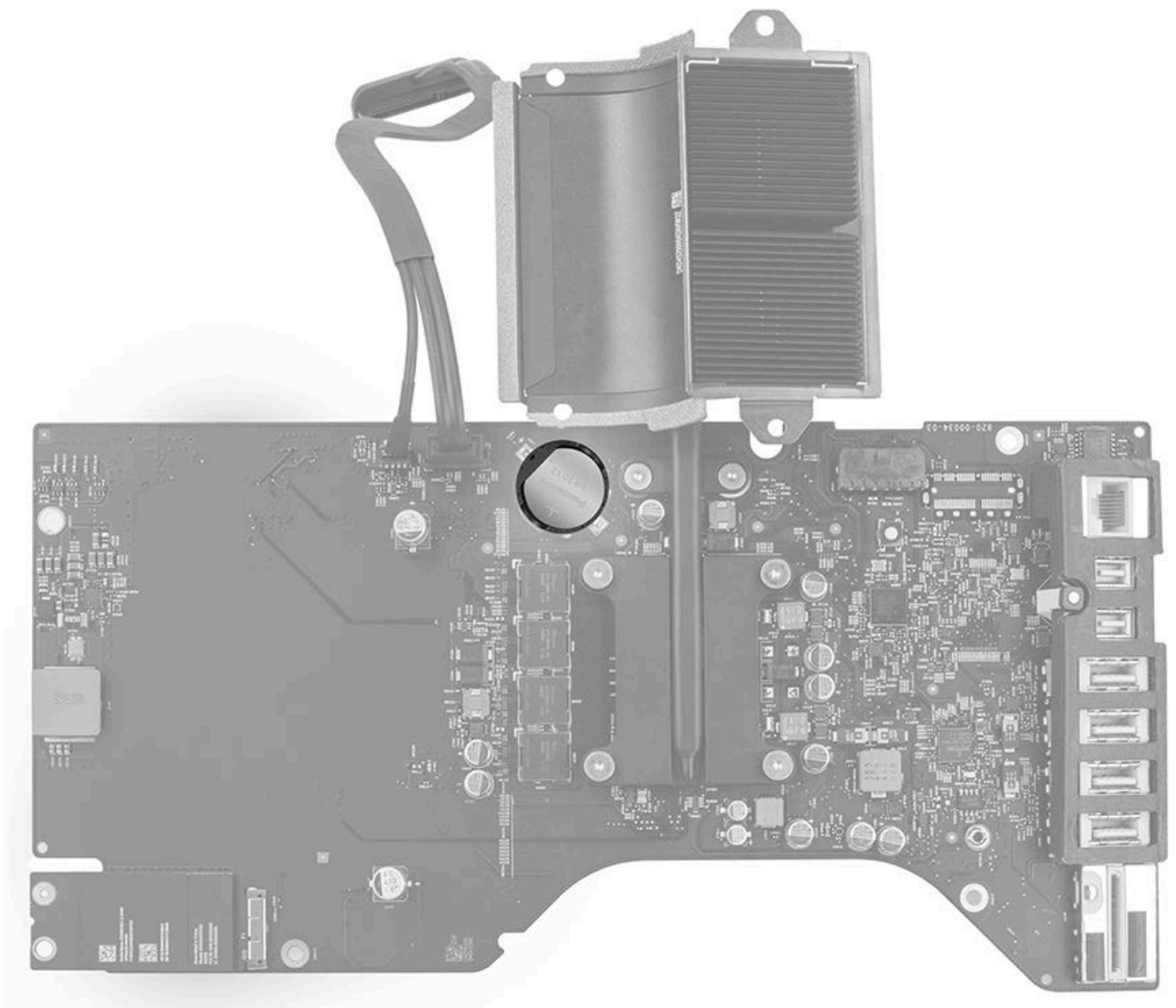
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

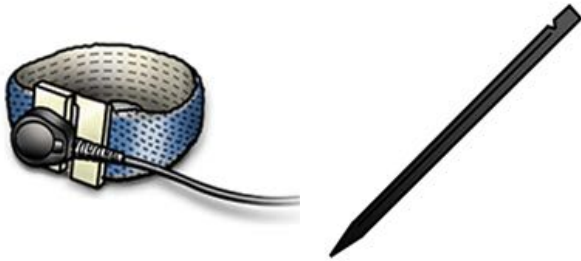
- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)

**Note:** The chin strap must be removed for this repair.



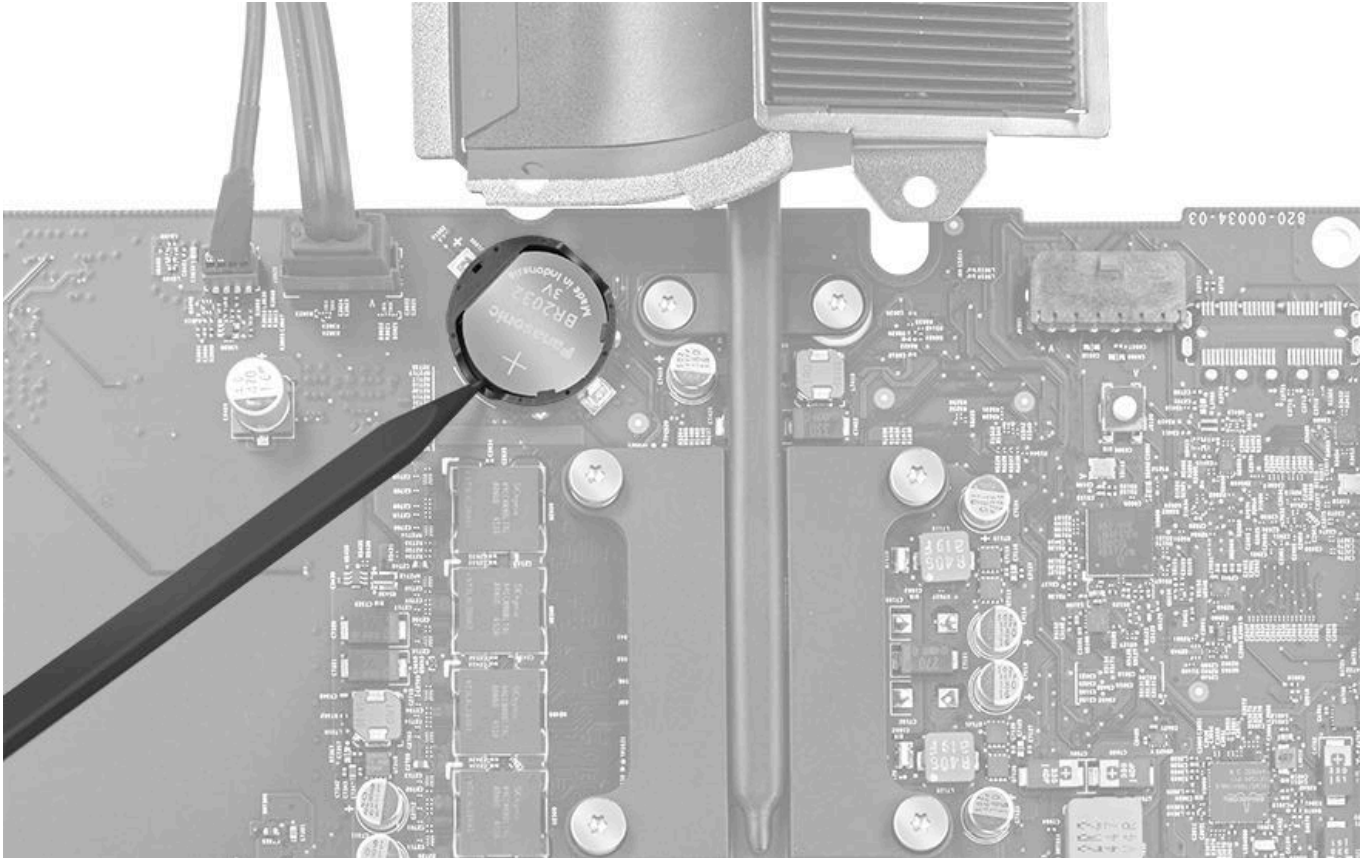
## Tools

- ESD mat and wrist strap
- Black stick



## Steps For Removal

1. Use a black stick to pry the battery from the socket on the back side of the logic board. The battery will spring out of the socket.



## Steps For Reassembly

**Warning:** If the battery is installed incorrectly, or if the battery is replaced by an incorrect type of battery, there is a risk of explosion. Dispose of used batteries according to local environmental laws and guidelines.

**Note:** Effective immediately, some coin cell batteries used on Mac systems are now available only from electronics parts distributors (for example, MCM). The coin battery noted below is no longer available to order via GSX. When the Mac repair process indicates the noted coin battery needs to be replaced, please order it from an electronics parts distributor. **Note:** BR2032 and CR2032 batteries have the same form factor and nominal voltage. However, BR2032 batteries have a lower self-discharge rate and broader operating temperature range than CR2032 batteries for longer shelf and service life.

1. Check that the battery socket on back side of the logic board is open and free of dust.
2. Press the battery (922-9869) into the socket with engraved markings (+ side) facing up.



3. Reinstall the [logic board](#).
4. Reinstall the [right speaker](#).
5. Reinstall the [chin strap](#).
6. Reinstall the [hard drive cradle](#).
7. Reinstall the [hard drive](#).
8. Reinstall the [hard drive brackets](#).
9. Reinstall the [fan](#).
10. Install new [display panel VHB strips](#).
11. Reinstall the [display panel](#).

# Hard Drive Combo Cable

## First Steps

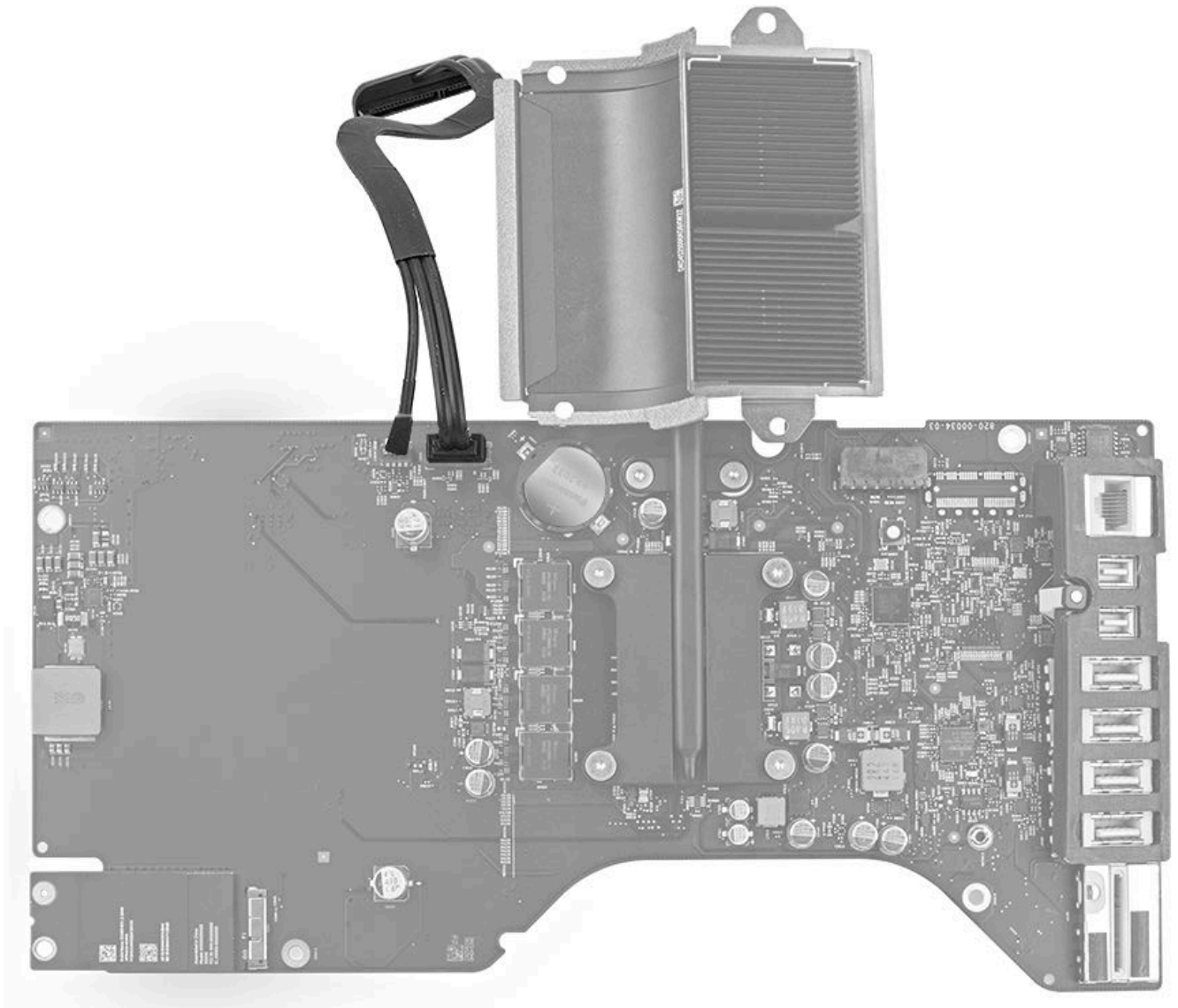
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

For video instruction, refer to article [SV239: Hard Drive Cables Replacement Video](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)

**Note:** The chin strap must be removed for this repair.



## Tools

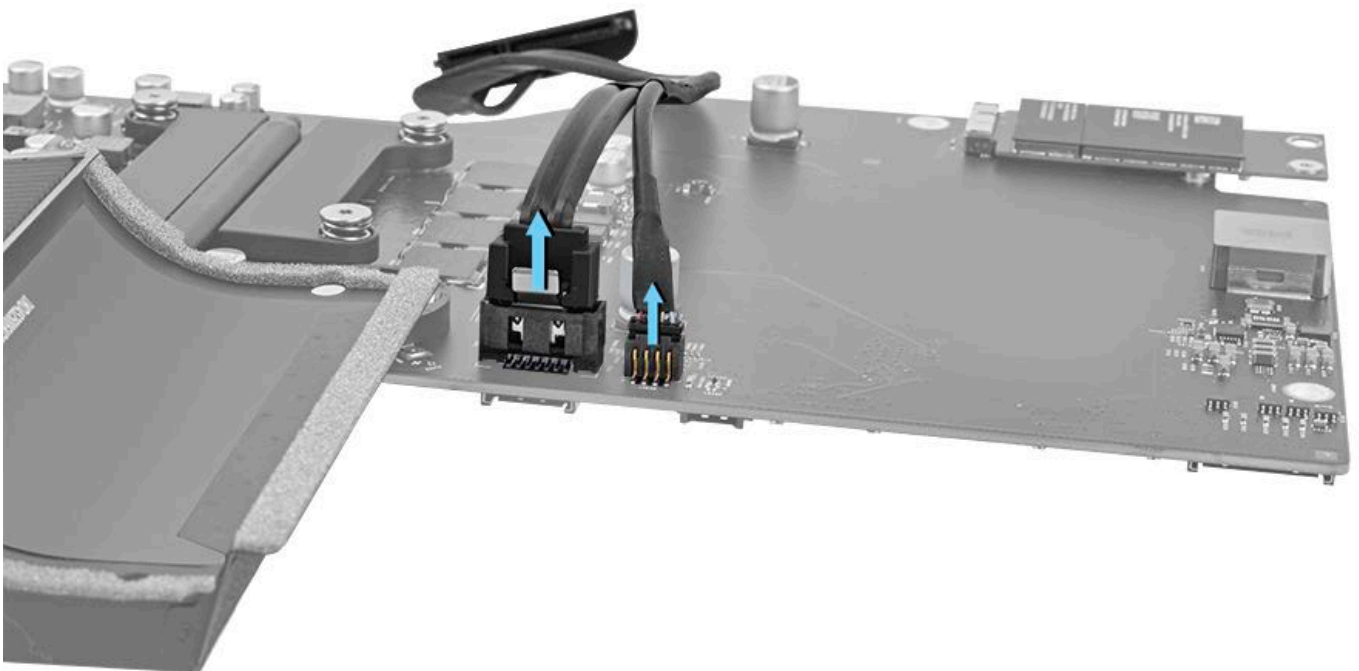
- ESD wrist strap and mat
- Black stick
- Service wedge (iMac)





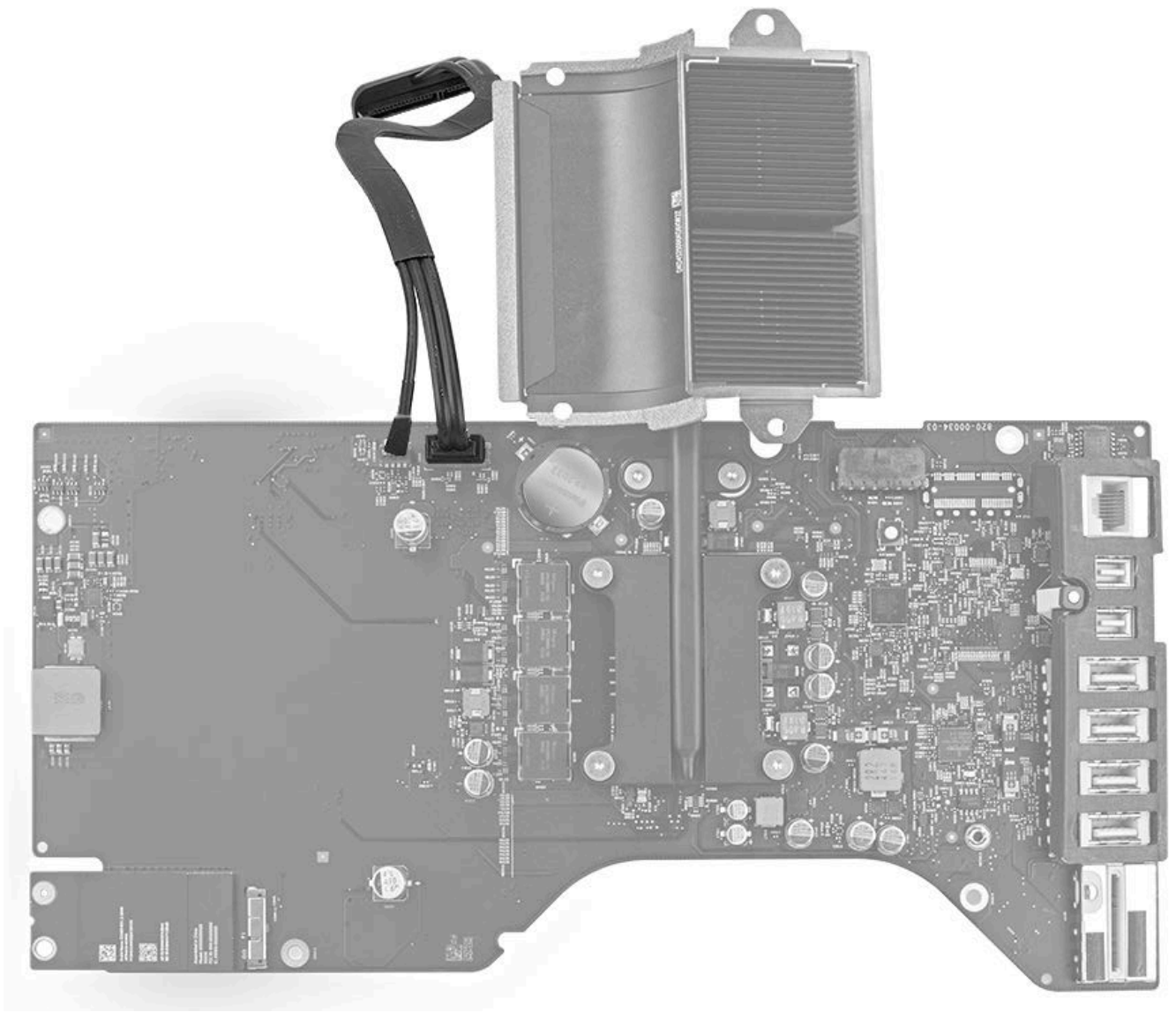
## Steps For Removal

1. Disconnect the hard drive data cable and the hard drive power cable from the back side of the logic board.

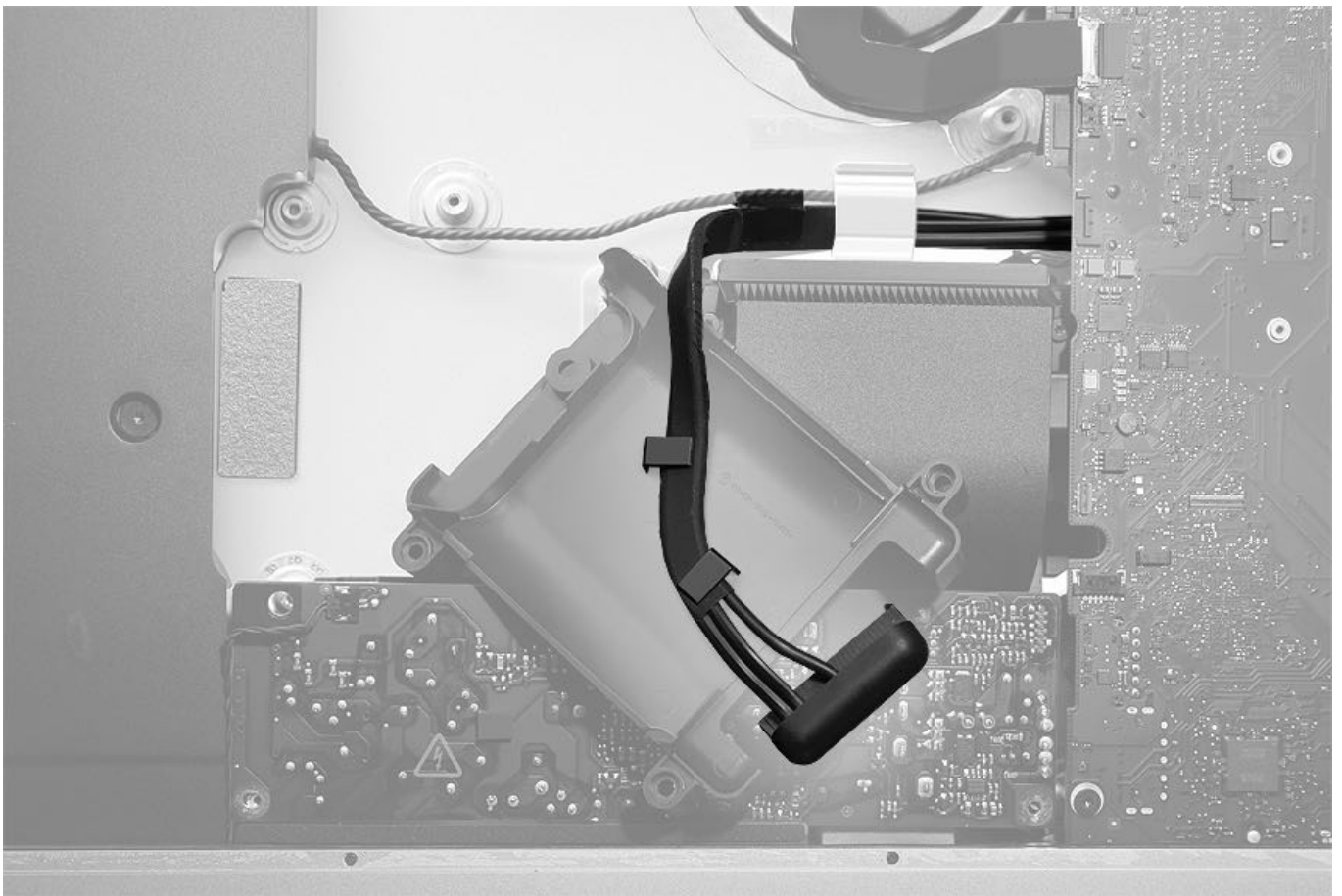


## Steps For Reassembly

1. Connect the hard drive data cable and the hard drive power cable onto their connectors on the back side of the logic board.



2. Reinstall the [logic board](#).
3. Route the combo cable under the rear housing clip.



4. Reinstall the [right speaker](#).
5. Reinstall the [chin strap](#).
6. Reinstall the [hard drive cradle](#).
7. Reinstall the [hard drive](#).
8. Reinstall the [fan](#).
9. Install new [display panel VHB strips](#).
10. Reinstall the [display panel](#).

# Power Supply

## First Steps

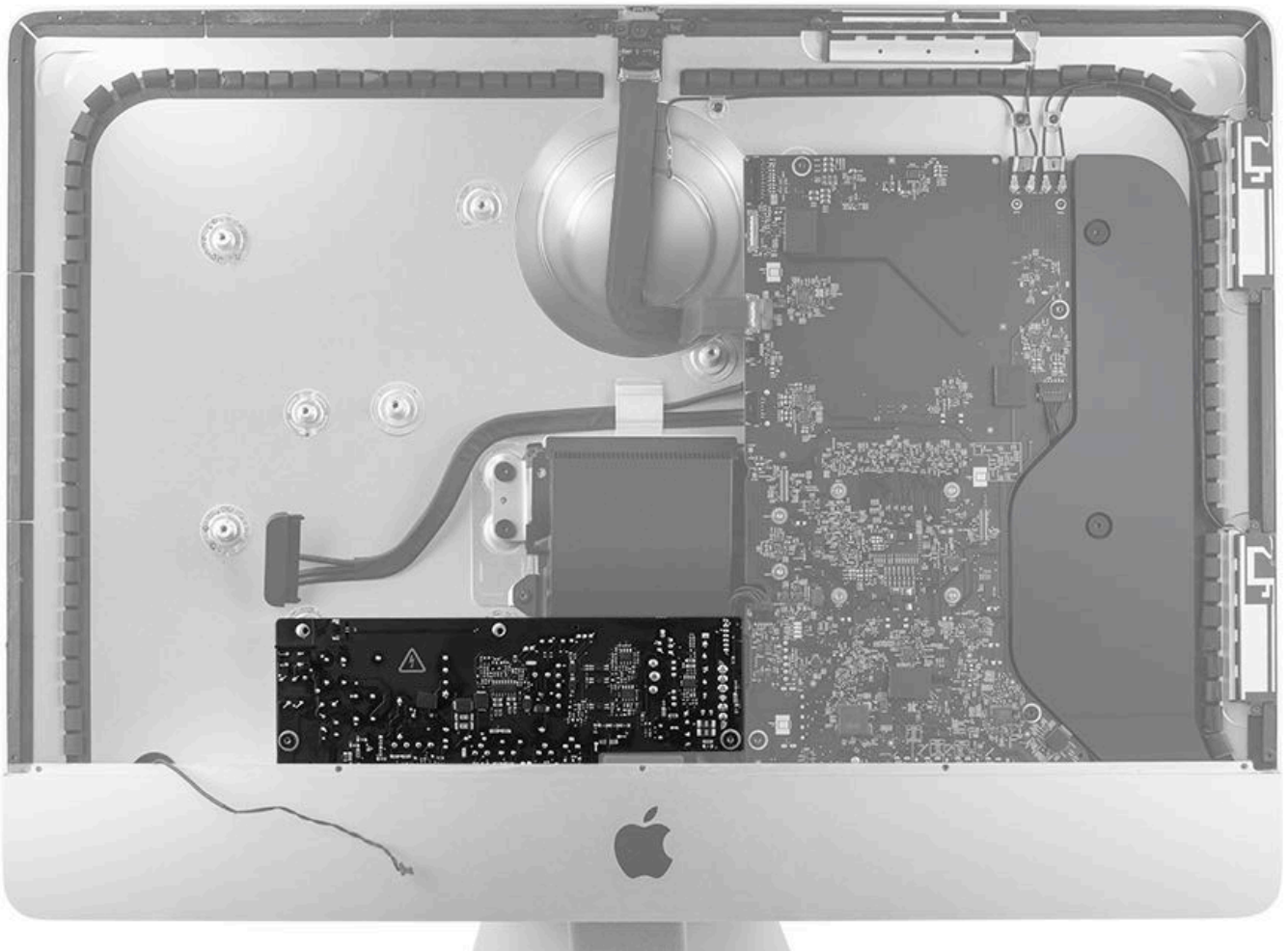
**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

For video instruction, refer to article [SV238: Power Supply Replacement Video](#).

Remove:

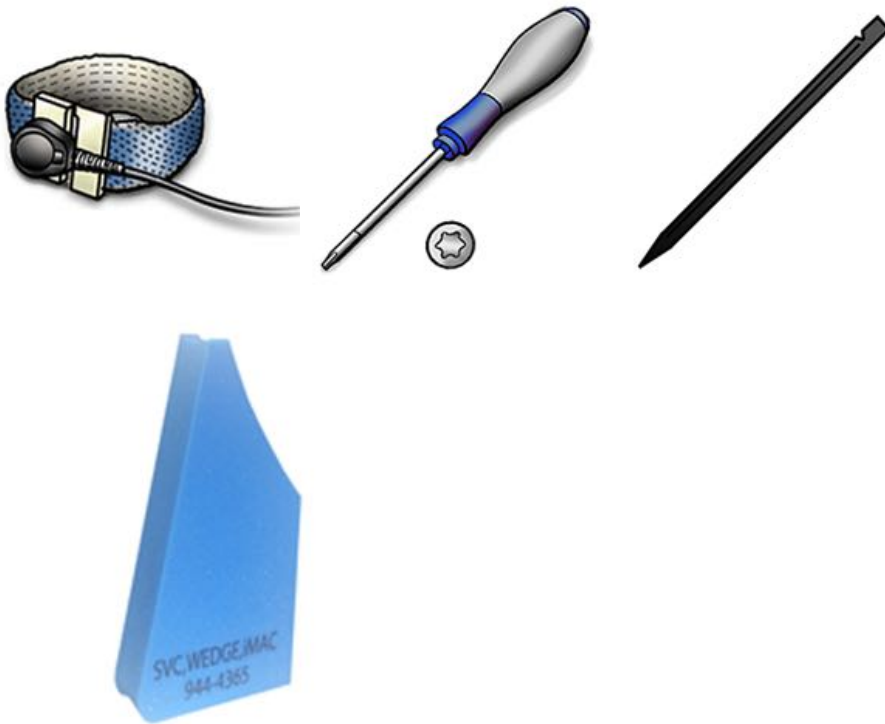
- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)

**Note:** The chin strap must be removed for this repair.



## Tools

- ESD wrist strap and mat
- Torx T8 screwdriver (magnetized)
- Black stick
- Service wedge (iMac)



## Steps For Removal



**Warning: HIGH VOLTAGE.** Use extreme caution when troubleshooting with the display panel removed. Avoid touching the logic board or power supply while the computer is plugged in, the power supply retains a charge whether or not the computer is on.

**After unplugging the computer from the electrical outlet, wait two minutes before removing display panel, disconnecting modules, or substituting cables and components. This will allow the power supply and logic board time to discharge.**

- Never remove or install any physical components while the computer is plugged in to an electrical outlet.
- When plugged in, the power supply and logic board are energized, even when the computer is turned off.
- Unplug the computer and allow sufficient time for the power supply and logic board to self-discharge before removing the display panel.
- Do NOT touch the logic board or power supply while the computer is plugged in, or before sufficient time has passed to discharge stored voltage to a safe level after being unplugged.

**Warning:** iMac (Late 2012 and later) models require two protective covers (923-0189) when performing live adjustments; one for the power supply and one for the backlight control circuitry on the logic board. Secure the covers to the rear housing with tape, as shown in the following articles:

- [TP833: iMac and Displays: Power Supply Cover Instructions](#)
- [TP914: iMac \(21.5-inch\): Safety](#)

## Electrical Safety Precautions

Before working on a computer with exposed, potentially energized parts:

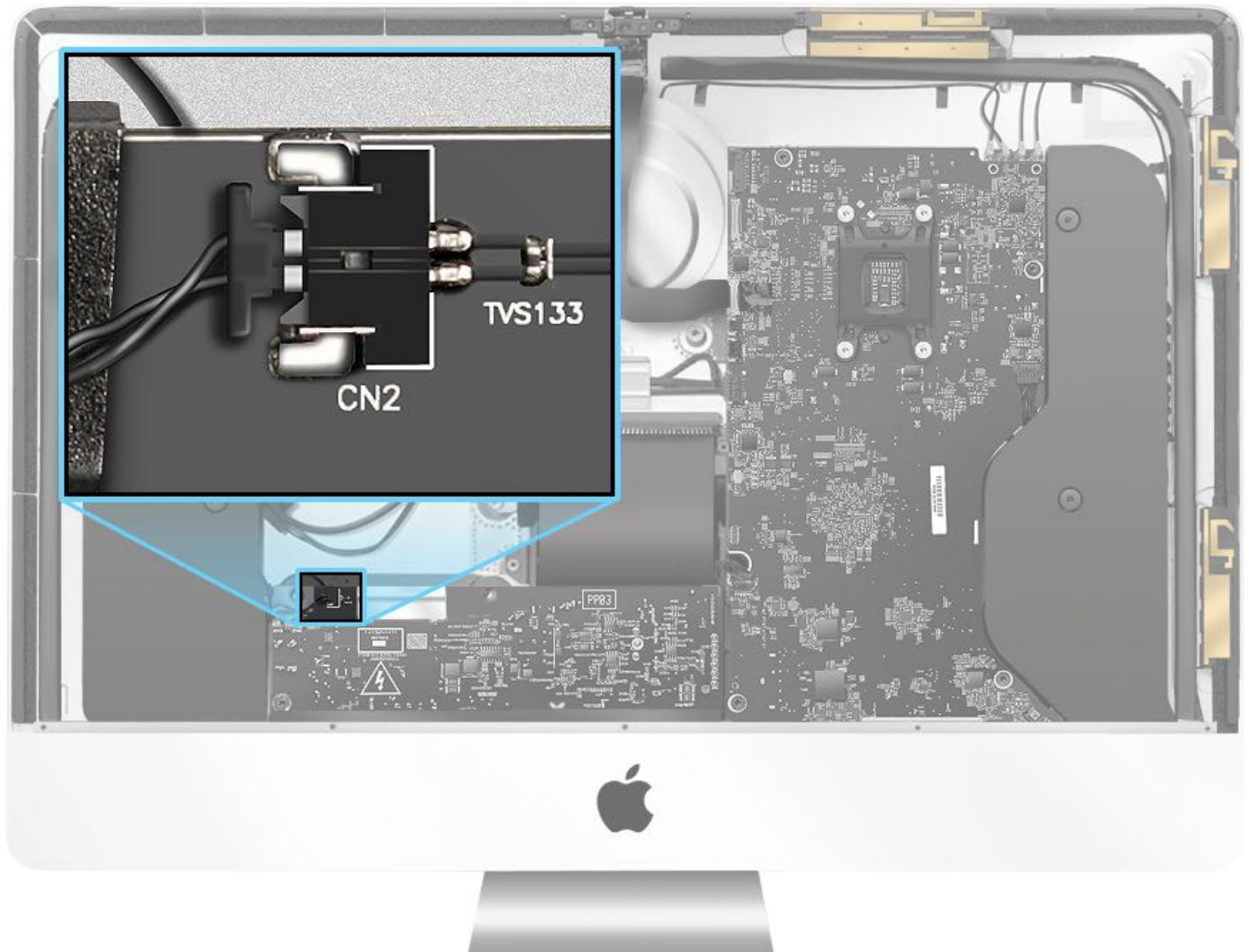
- Remove rings, watches, necklaces, metal-rimmed eyewear, and other metallic articles which increase your risk of electric shock.
- Do not wear a cell phone or other signaling device, as these may cause a dangerous startle reflex during energized work.
- **If the iMac needs to be plugged in for LED checks or similar troubleshooting, do NOT wear an ESD wrist strap.** Wearing ESD grounding systems increases your risk of electric shock.
- Remain alert, focused on the work being performed, and aware of the proximity of grounded objects to your body.



- Use the plastic black stick or other nonmetal extension tool as needed to connect or disconnect cables, to keep fingers away from potentially energized parts.

1. It is possible to remove the power supply without removing the left speaker, hard drive brackets, hard drive, and hard drive cradle. There is less space to maneuver the cables and power supply, but the power supply can be removed. If the power supply is removed this way, make sure to carefully disconnect the power button cable from the top left corner of the power supply.

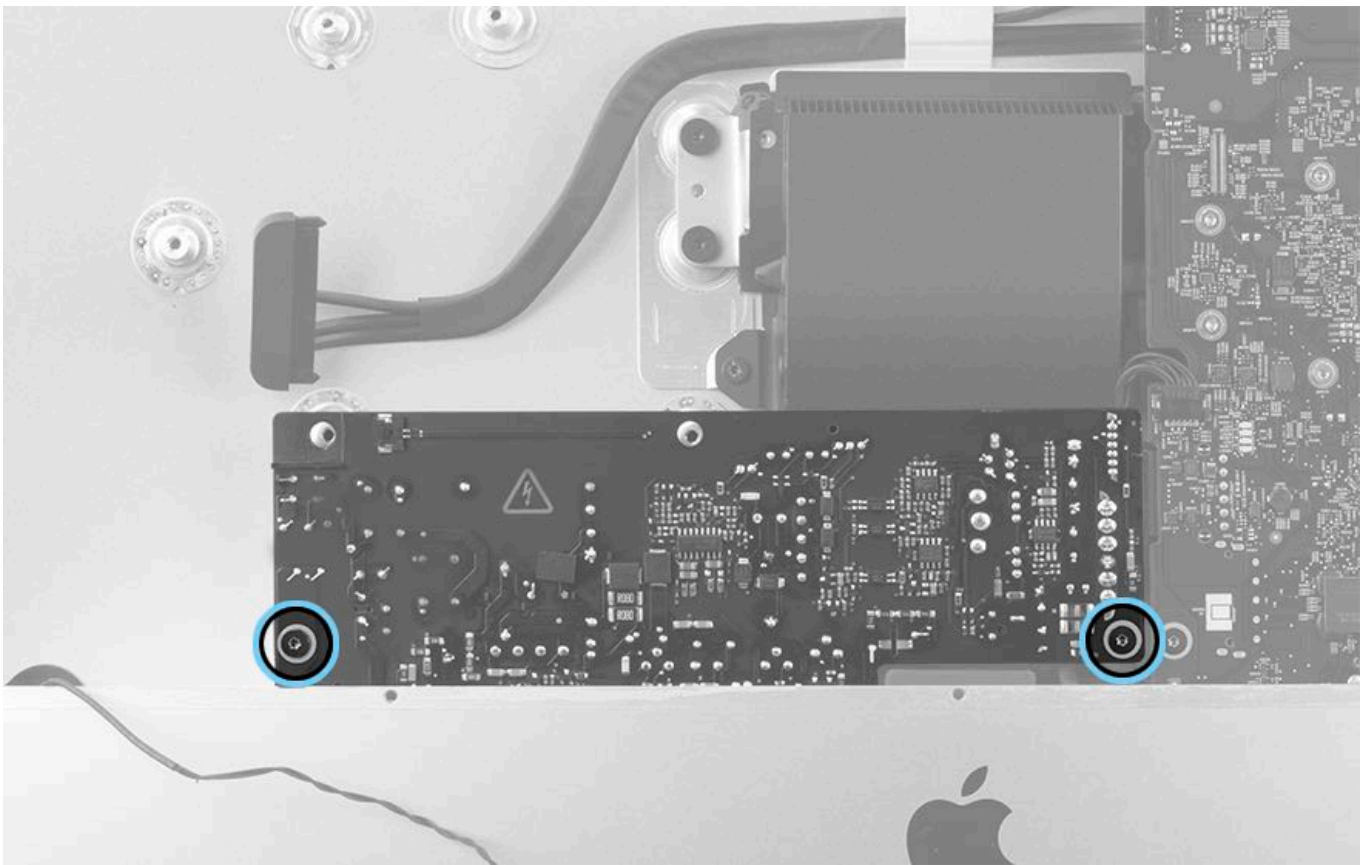
**Note:** If the power button cable breaks, the rear housing will need to be replaced. The power button cable is not available separately.



2. Remove two T8 screws from the power supply.

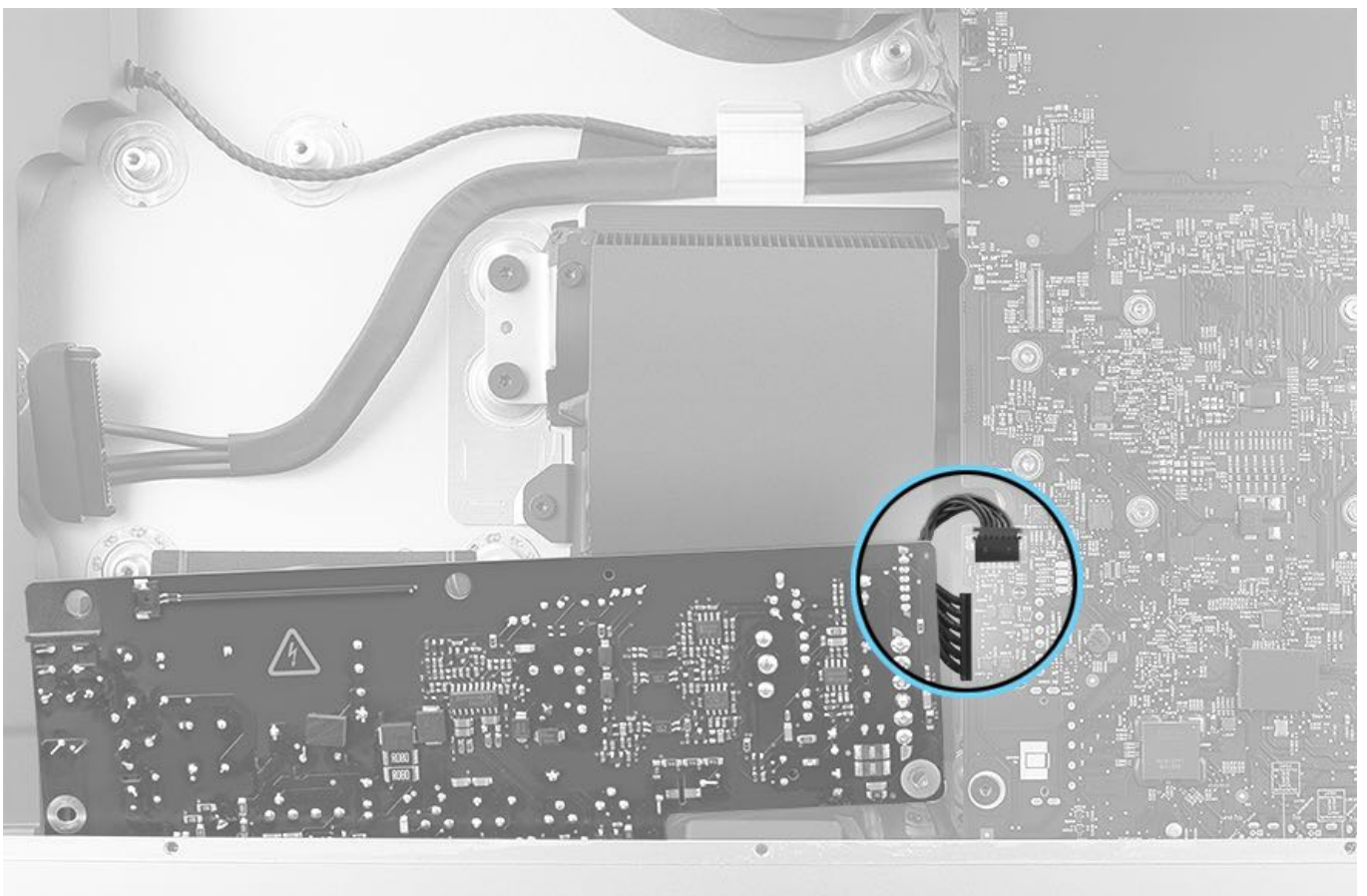
- T8: 923-0331, 9.9 mm

**Note:** Removing the [hard drive cradle](#) requires that the power supply screws be loosened, but not removed. For repairs that require that the hard drive cradle be removed, loosen the two screws enough to allow the power supply to be tipped forward and lift the hard drive cradle over the screw bosses.

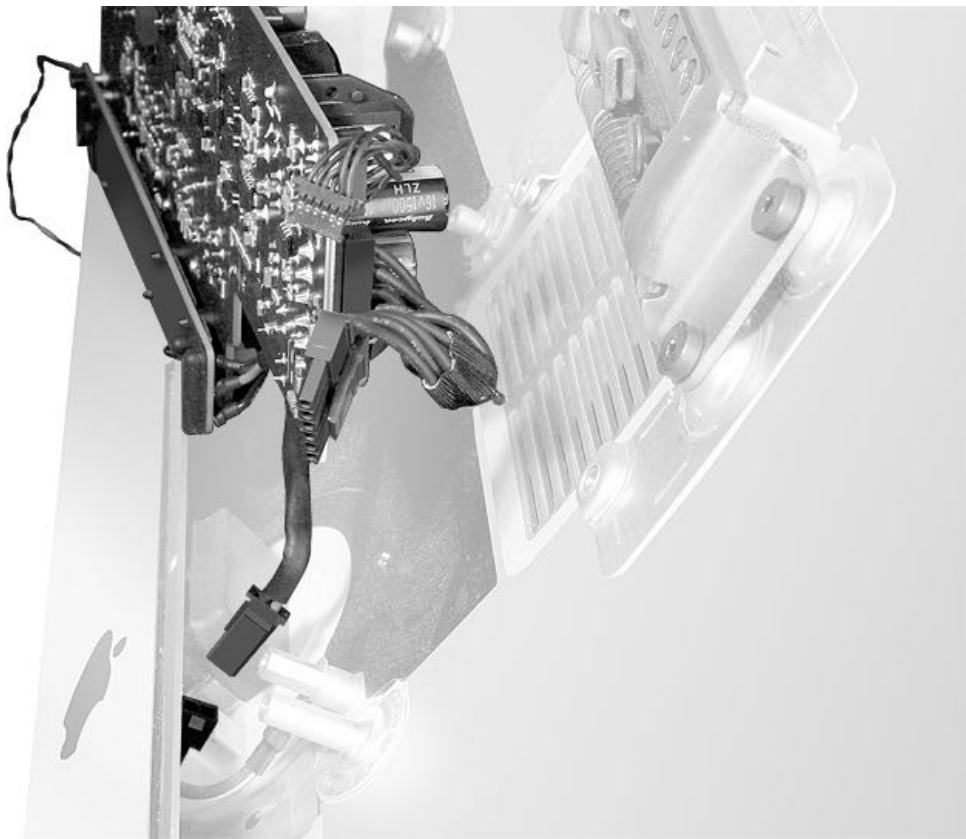


3. Slide the power supply out of the chin as far as it will go. Disconnect the DC power and data cables from the logic board (first image), then disconnect the AC filter cable (second image) from the AC filter in the rear housing.

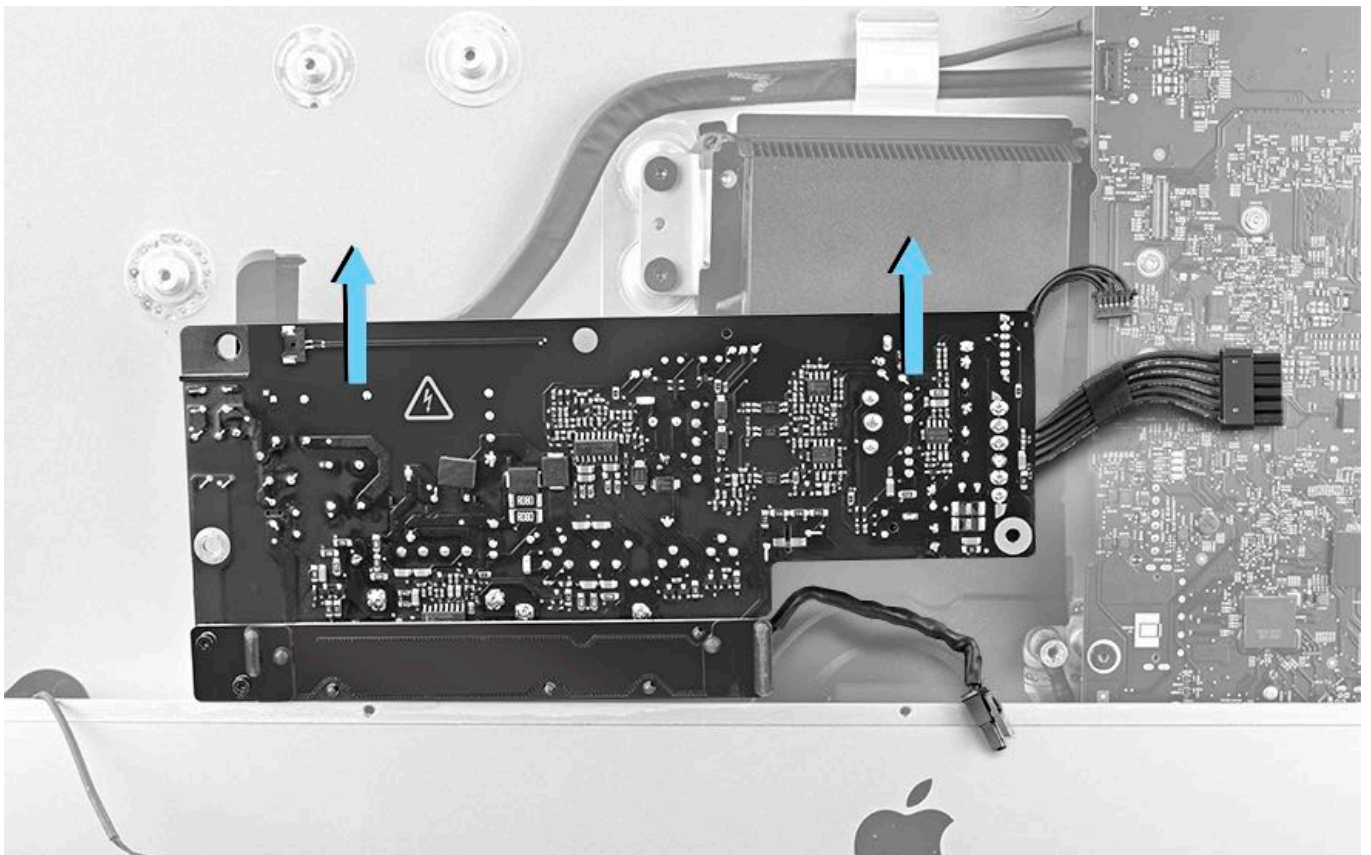
#### DC power and data cables



#### AC filter cable



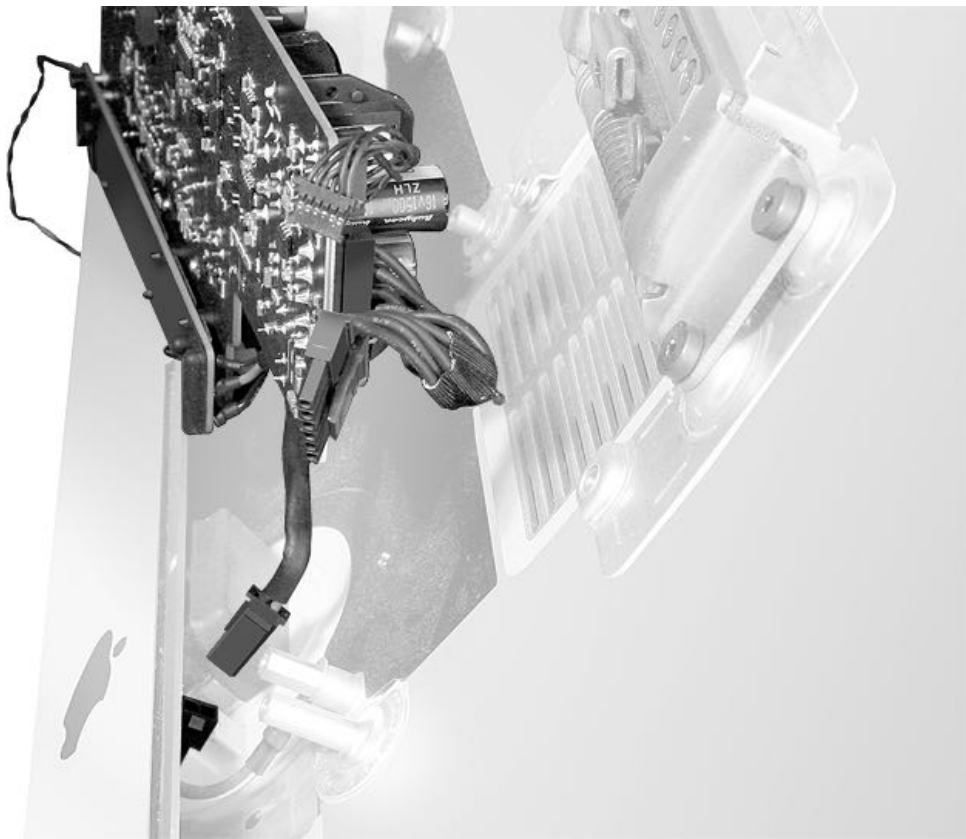
4. Lift the power supply up and out of the chin well.



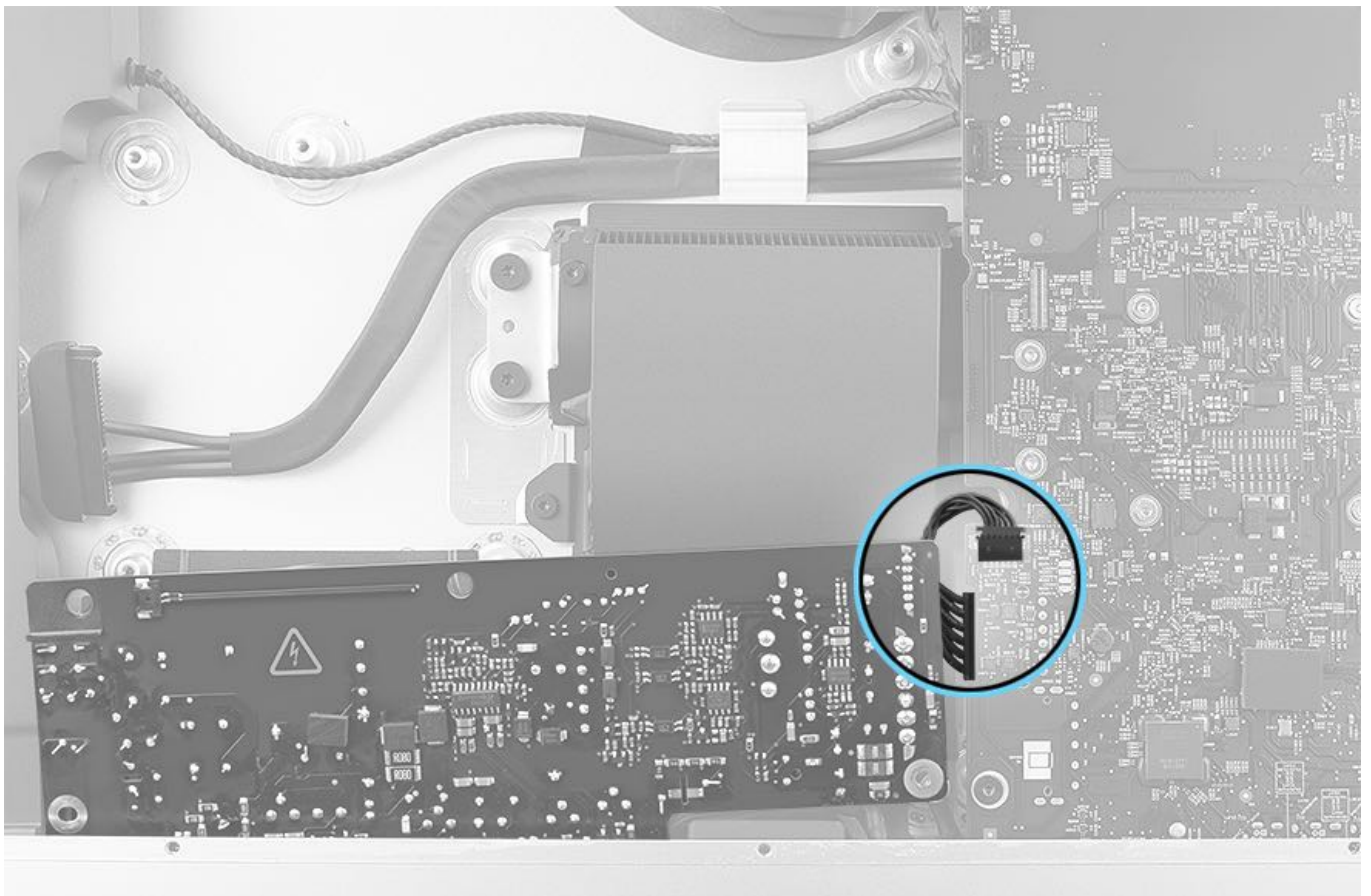
### Steps For Reassembly

1. Connect the AC filter cable to the AC filter in the rear housing. The cable only connects in one direction.

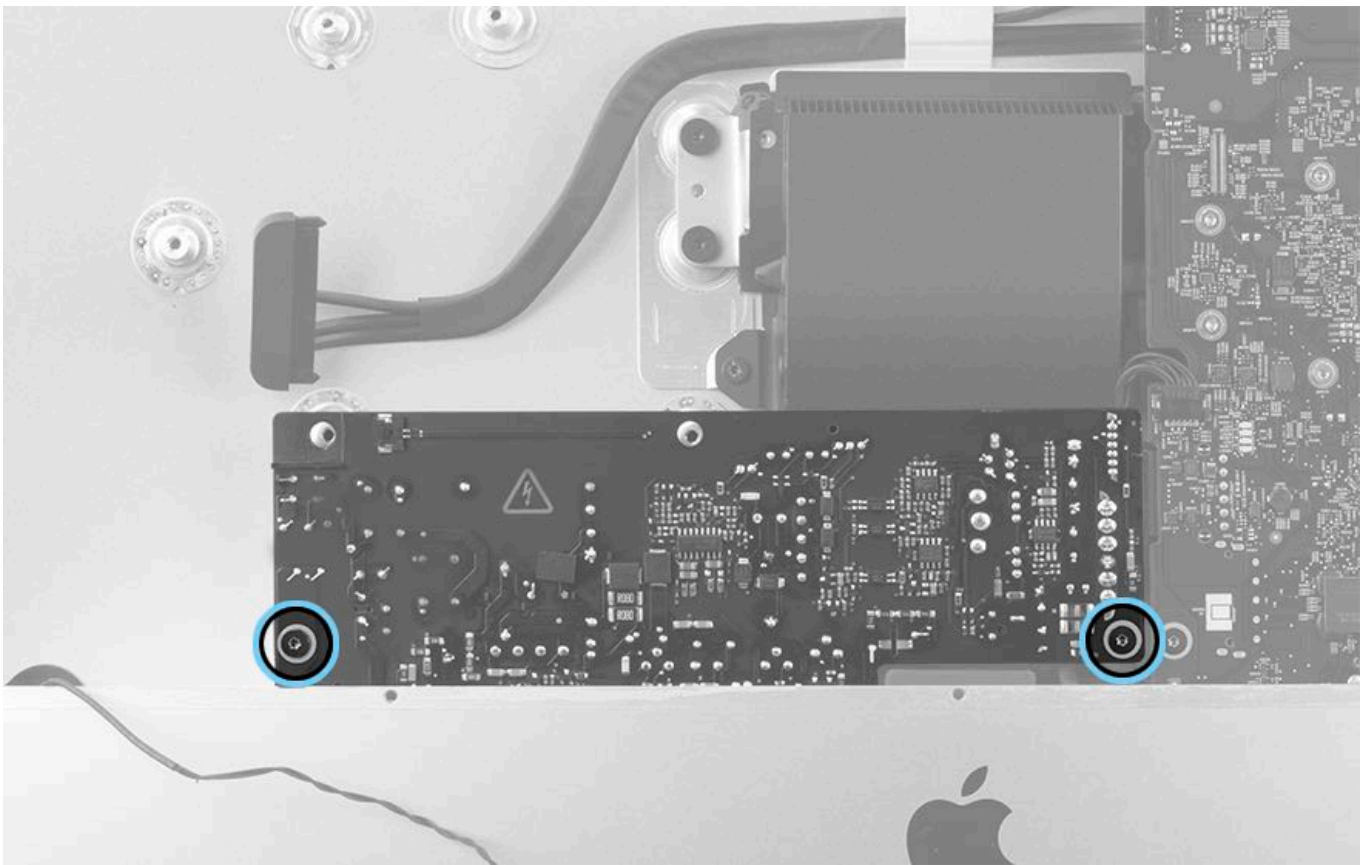




2. Carefully slip the power supply under the rear housing chin. Connect the DC power and data cables to the logic board.



3. Replace the two T8 power supply screws.

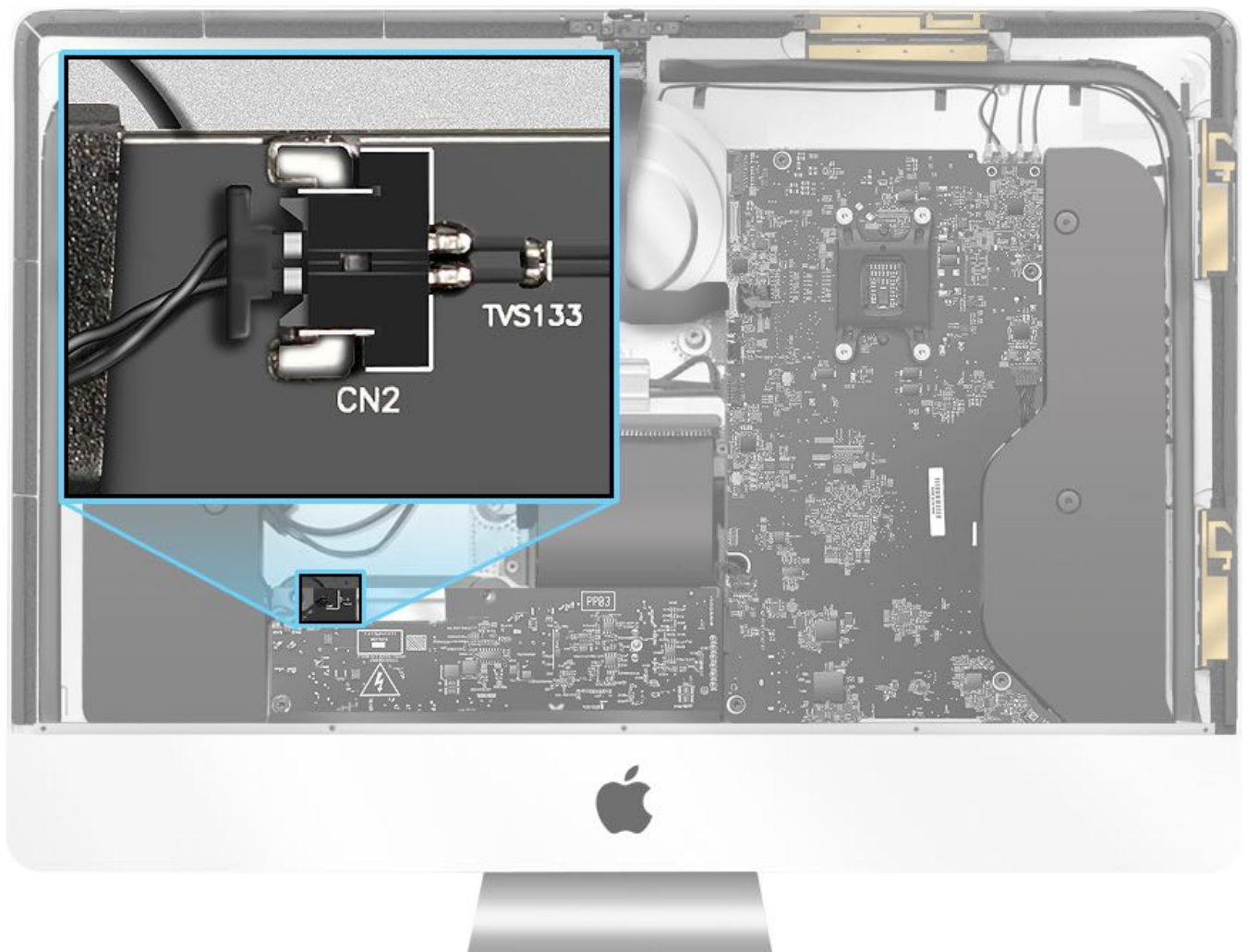


4. If removed, reinstall the [left speaker](#).

5. Connect the power button cable to the power supply and route it along the side of the left speaker.

**Note:** If the power button cable breaks the rear housing will need to be replaced. The power button cable is not available separately.





6. Reinstall the [chin strap](#).
7. Reinstall the [hard drive cradle](#) if it was removed.
8. Reinstall the [hard drive](#) if it was removed.
9. Reinstall the [hard drive brackets](#) if they were removed.
10. Reinstall the [fan](#).
11. Install new [display panel VHB strips](#).
12. Reinstall the [display panel](#).

# Stand

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

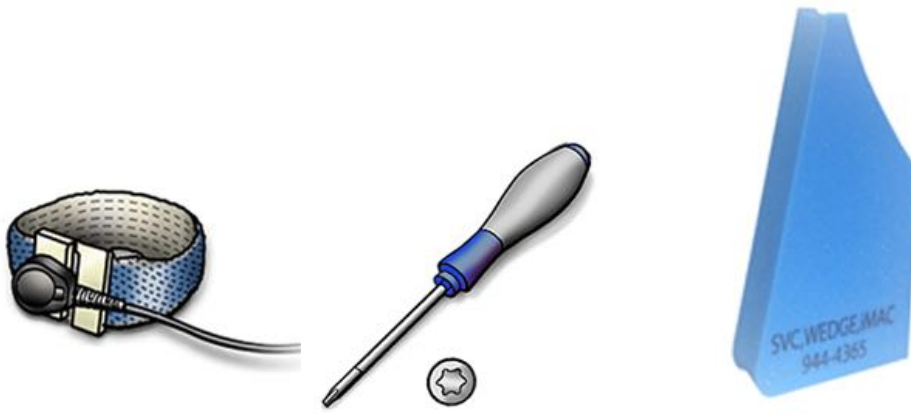
- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)

**Note:** The chin strap must be removed for this repair.



## Tools

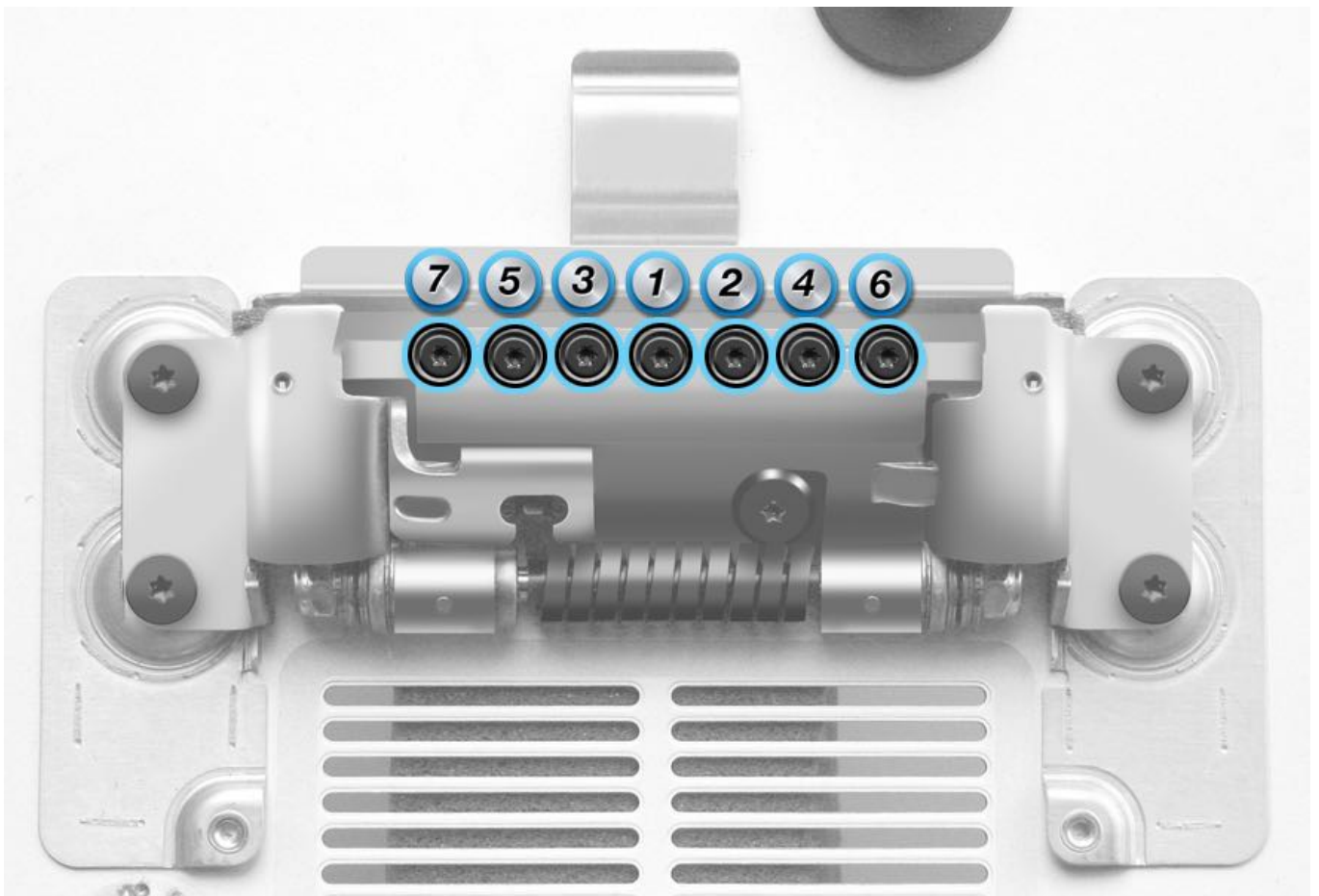
- ESD wrist strap
- Torx T8 screwdriver (magnetized)
- Service wedge (iMac)



## Steps For Removal

1. Remove seven screws in the following order:

- T8: 7.5 mm (922-00529)

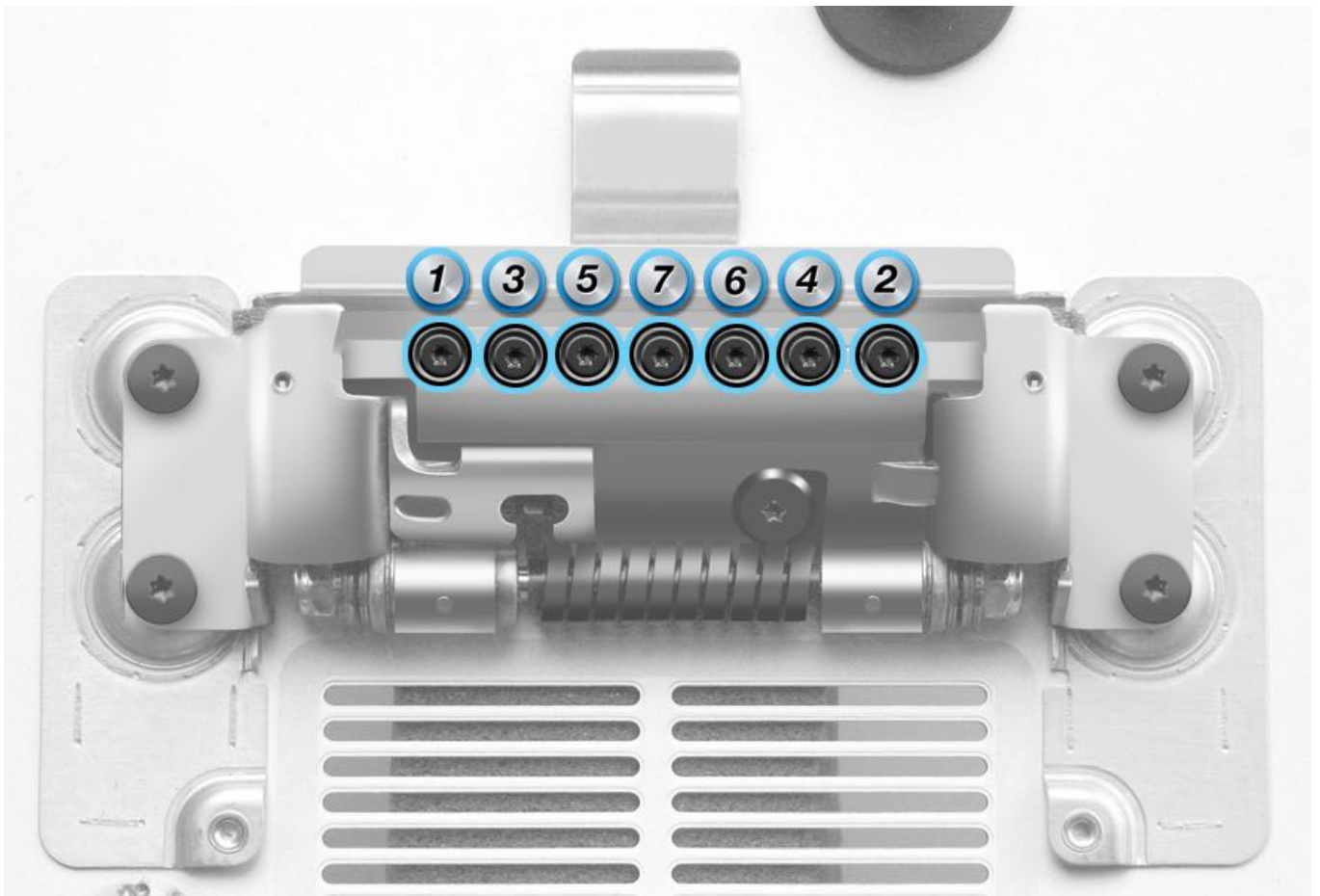


2. Lift the rear housing off of the stand.



### Steps For Reassembly

1. Align the two pins on the stand with the pin holes on the mechanism.
2. Install seven screws in the following order:
  - T8: 7.5 mm (922-00529)



3. Reinstall the [logic board](#).
4. Reinstall the [right speaker](#).
5. Reinstall the [chin strap](#).
6. Reinstall the [hard drive cradle](#).
7. Reinstall the [hard drive](#).
8. Reinstall the [hard drive brackets](#).
9. Reinstall the [fan](#).
10. Install new [display panel VHB strips](#).
11. Reinstall the [display panel](#).



# Mechanism

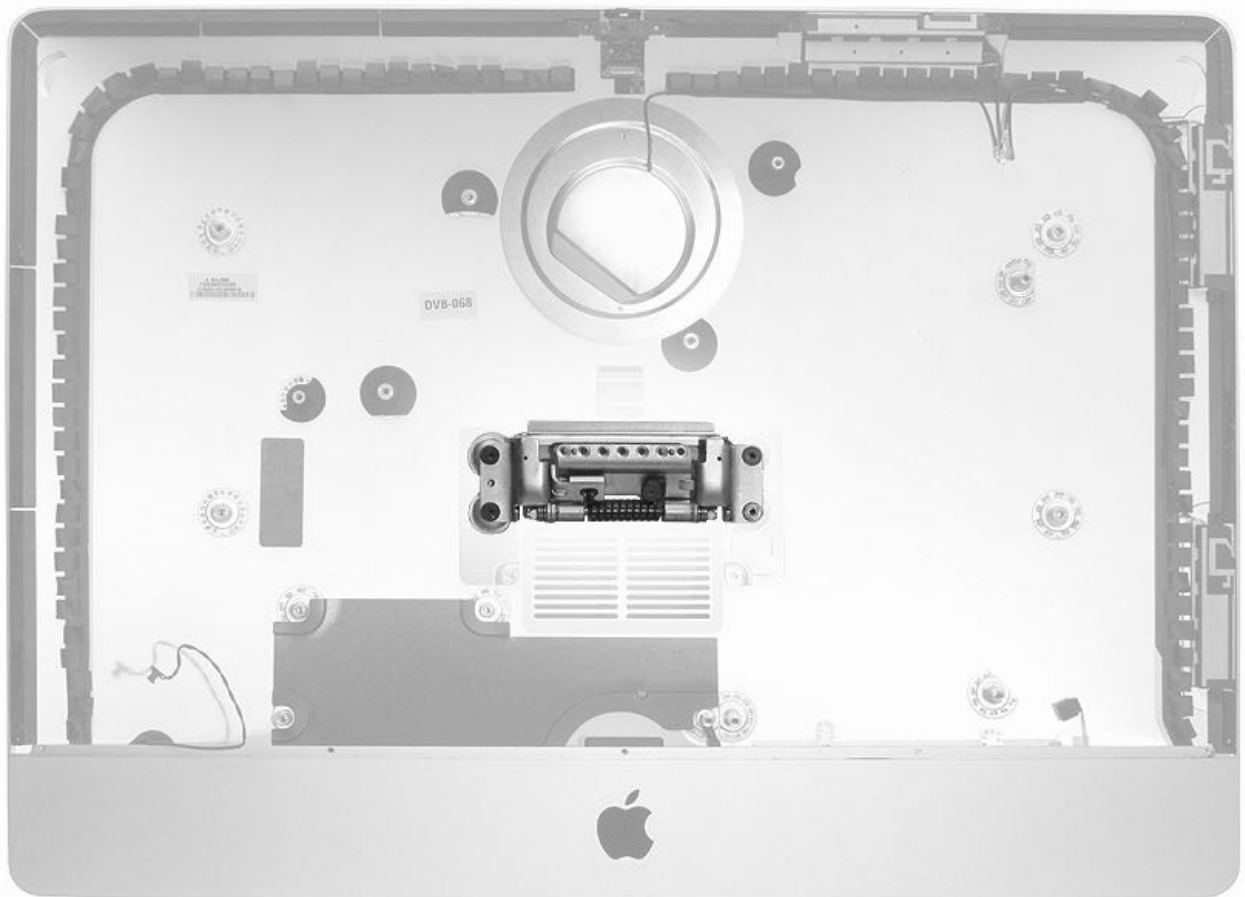
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Right speaker](#)
- [Logic board](#)
- [Stand](#)

**Note:** The chin strap must be removed for this repair.



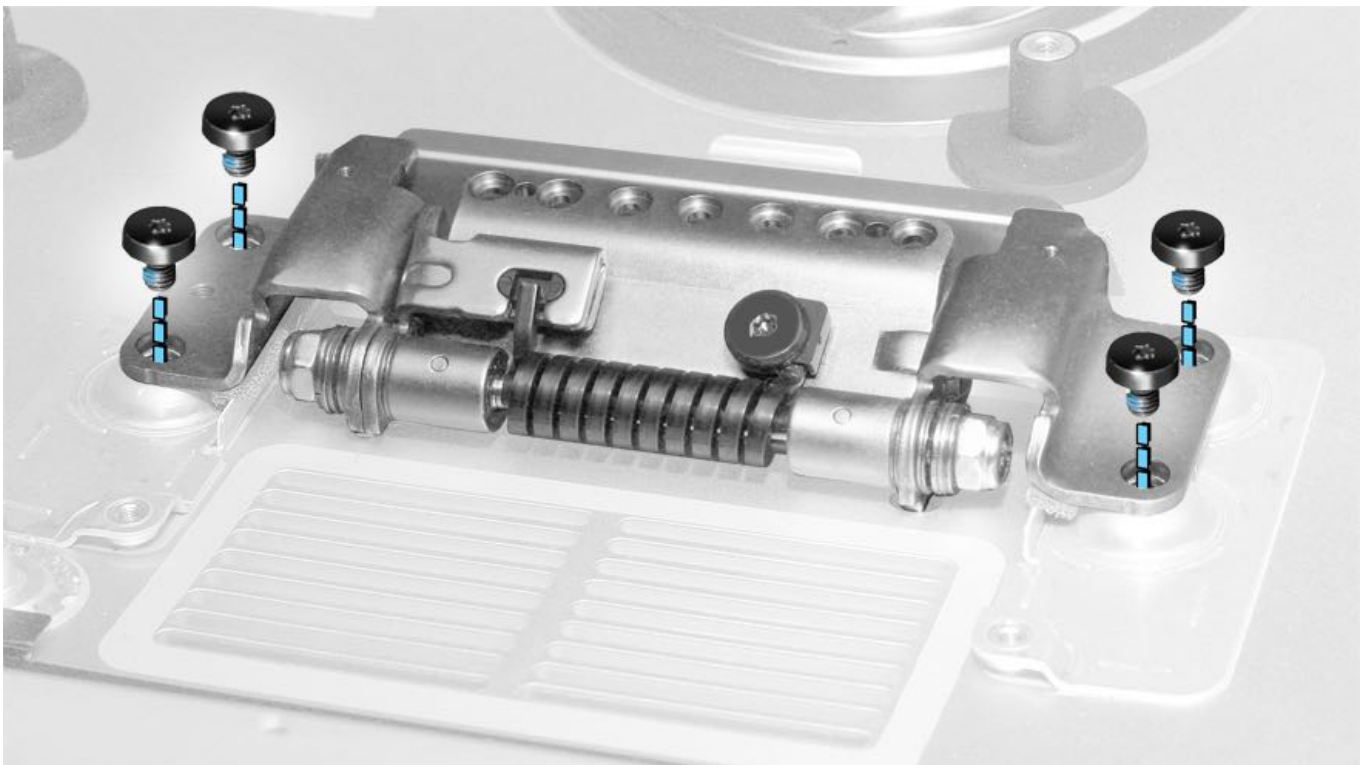
## Tools

- ESD wrist strap and mat
- Torx T10 screwdriver (magnetized)
- Soft cloth



### Steps For Removal

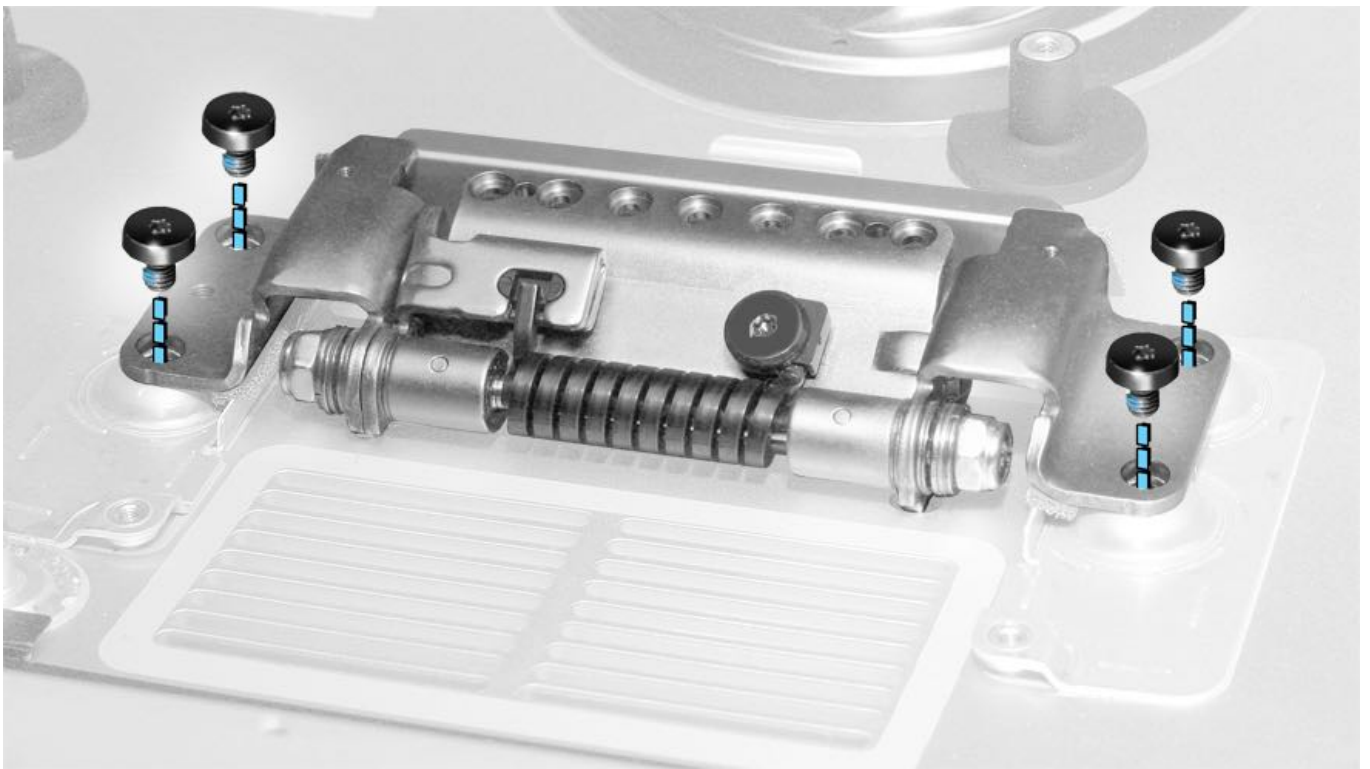
1. Lay the computer on a soft cloth.
2. Remove four screws.
  - T10: (923-0334)
3. Lift the mechanism off of the rear housing.



### Steps For Reassembly

1. Position the mechanism in the rear housing.
2. Install four screws.
  - T10: (923-0334)

**Note:** Check that the hinge is fully seated after tightening the screws to avoid hinge noise.



3. Reinstall the [stand](#).
4. Reinstall the [logic board](#).
5. Reinstall the [right speaker](#).
6. Reinstall the [chin strap](#).
7. Reinstall the [hard drive cradle](#).
8. Reinstall the [hard drive](#).
9. Reinstall the [hard drive brackets](#).
10. Reinstall the [fan](#).
11. Install new [display panel VHB strips](#).
12. Reinstall the [display panel](#).

# Rear Housing

## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

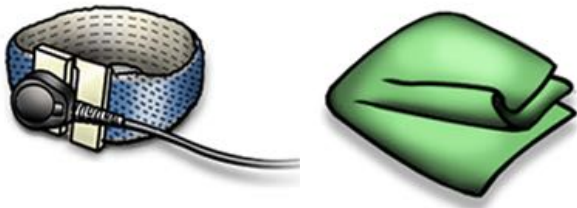
- [Display panel](#)
- [Display panel VHB strips](#)
- [Camera](#)
- [Camera/microphone cable](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)
- [Right speaker](#)
- [Logic board](#)
- [Power supply](#)
- [Stand](#)

**Note:** The chin strap must be removed for this repair.



## Tools

- ESD wrist strap
- Lint-free cloth



## Steps For Removal

1. Lay the rear housing on a soft cloth to avoid scratching.
2. With all other modules removed, the rear housing is the remaining assembly.

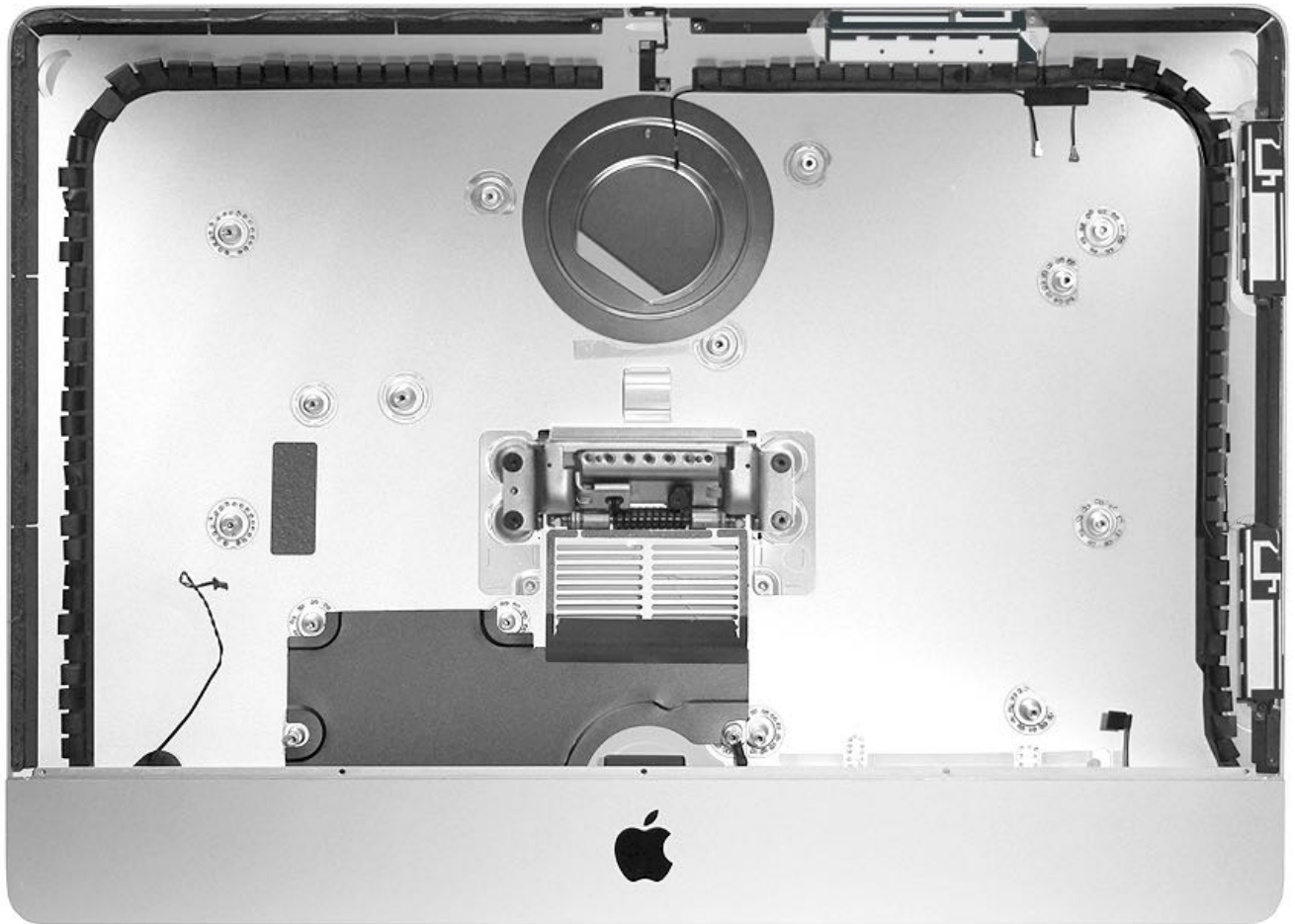
A replacement iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015) rear housing includes the following parts, which are available separately:

- Mechanism
- Mechanism screws
- Bluetooth antenna (upper)
- Wi-Fi antennas (middle and lower)

A replacement iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015) rear housing includes the following parts, which are **NOT** available separately:

- Wi-Fi antenna in silver circle behind Apple logo
- Microphone
- Power button and cable
- AC inlet
- Audio input jack and cable
- Gaskets





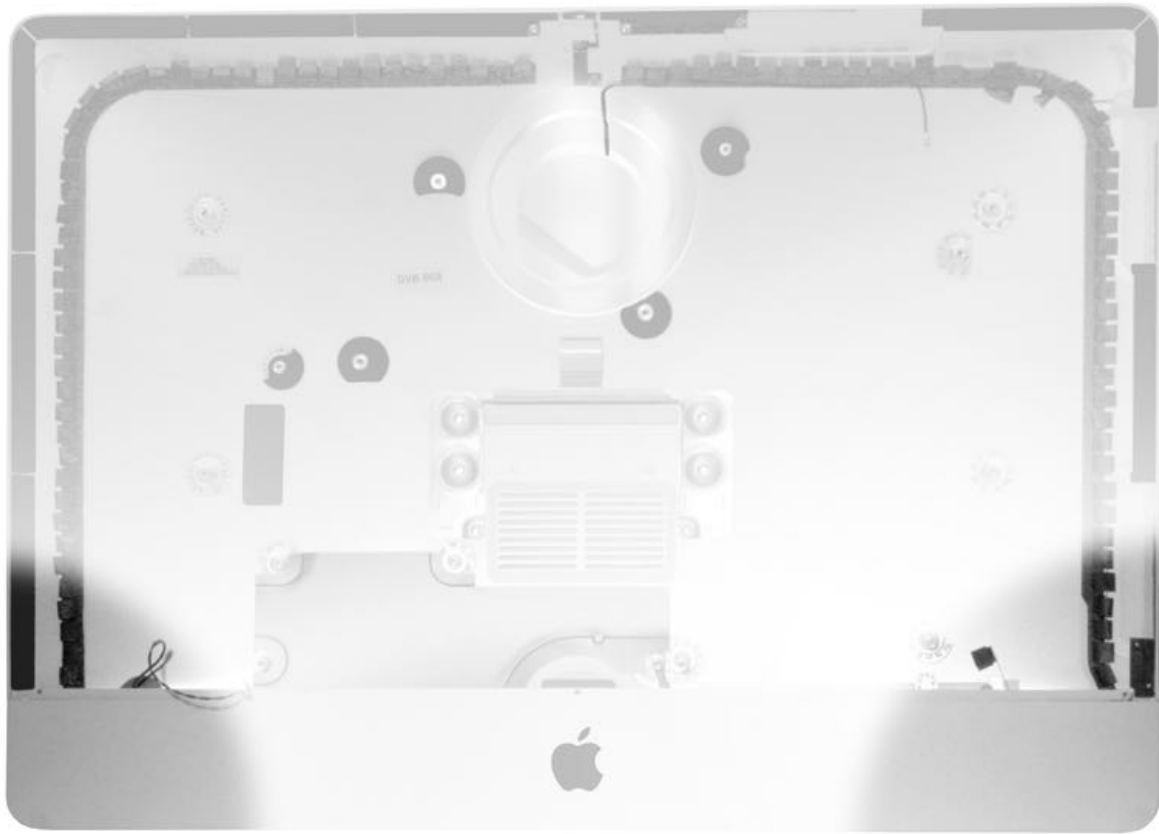
## Steps For Reassembly

1. Install the [stand](#).
2. Install the [power supply](#).
3. Install the [logic board](#).
4. Install the [right speaker](#).
5. Install the [left speaker](#).
6. Install the [chin strap](#).
7. Install the [hard drive cradle](#).
8. Install the [hard drive](#).
9. Install the [hard drive brackets](#).
10. Install the [fan](#).
11. Install the [camera/microphone cable](#).
12. Install the [camera](#).
13. Install new [display panel VHB strips](#).
14. Install the [display panel](#).

## Handling The Rear Housing

**Always** handle the rear housing with two hands in the lower left and right corners. Never carry the rear housing with a single hand, or by holding the aluminum chin (where the Apple logo appears on lower front).

Handling the rear housing part incorrectly could flex the aluminum and cause alignment issues.



# VESA Mount Adapter

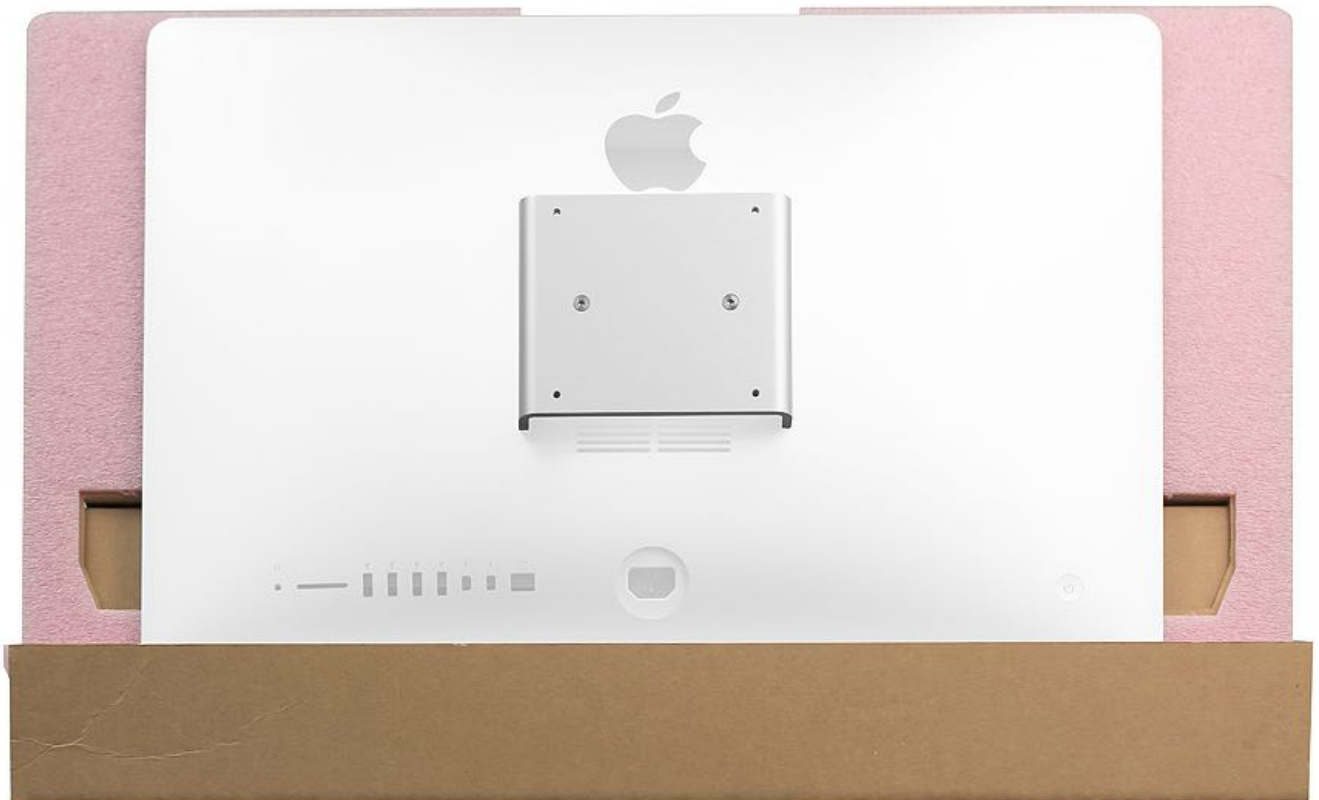
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

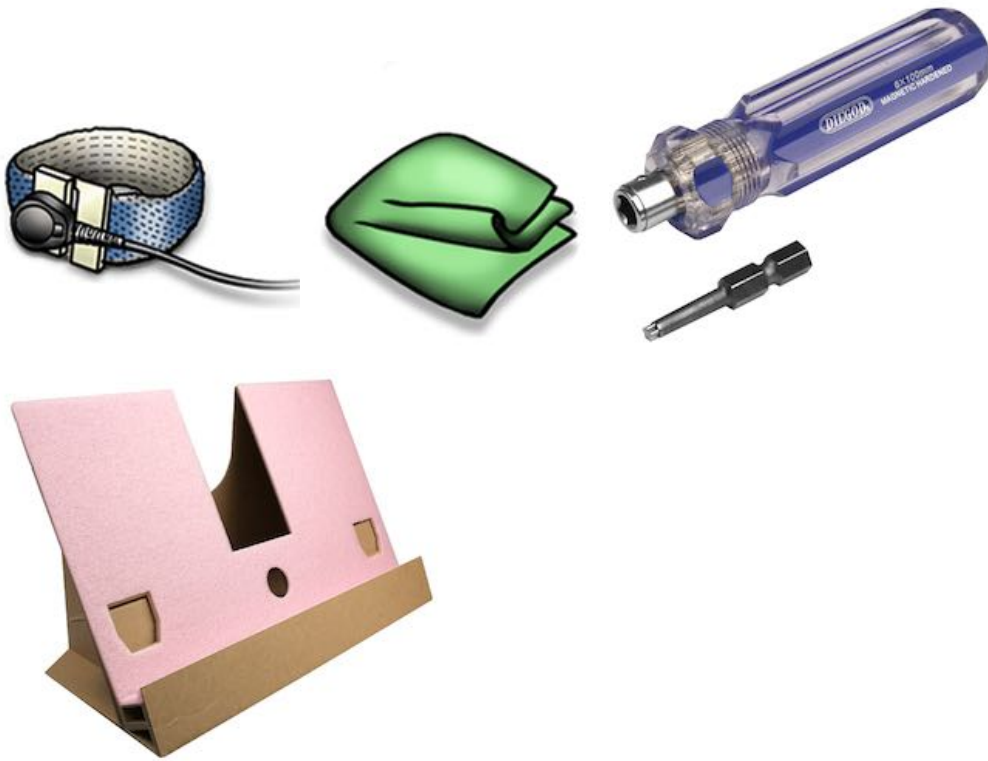
- [Display panel](#)
- [Display panel VHB strips](#)
- [Camera](#)
- [Camera/microphone cable](#)
- [Bluetooth antenna](#)
- [Middle Wi-Fi antenna](#)
- [Lower Wi-Fi antenna](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)
- [Right speaker](#)
- [Logic board](#)
- [Power supply](#)

**Note:** The chin strap must be removed for this repair.



## Tools

- ESD wrist strap and mat
- Lint-free cloth
- Kit, LCD Display, VHB for VESA systems (076-1437) (not pictured)
- VESA pentalobe driver (923-0367)
- LCD service support stand (923-0416)

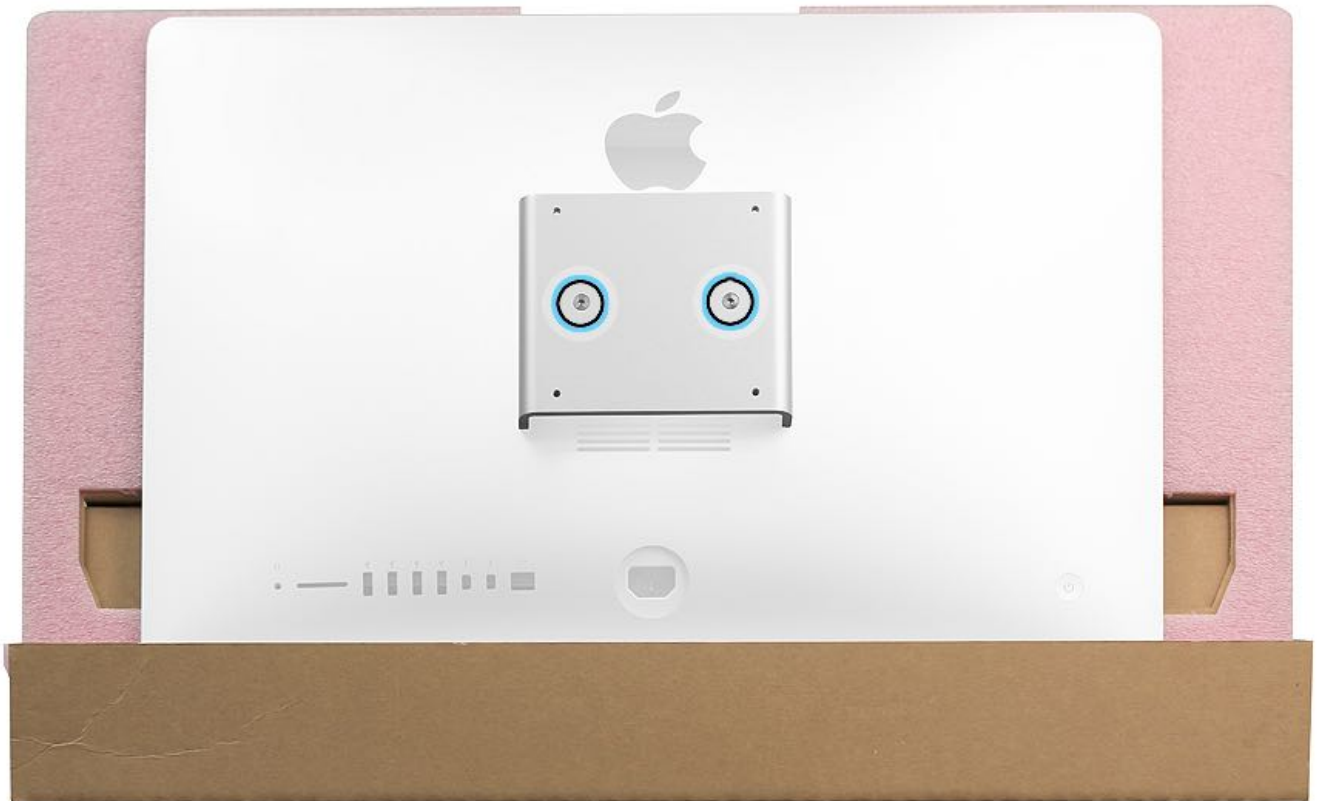


### Steps For Removal

1. Place the rear housing on the LCD support stand, with the VESA mount adapter facing you.
2. Remove two screws.
  - Pentalobe: (923-0417)

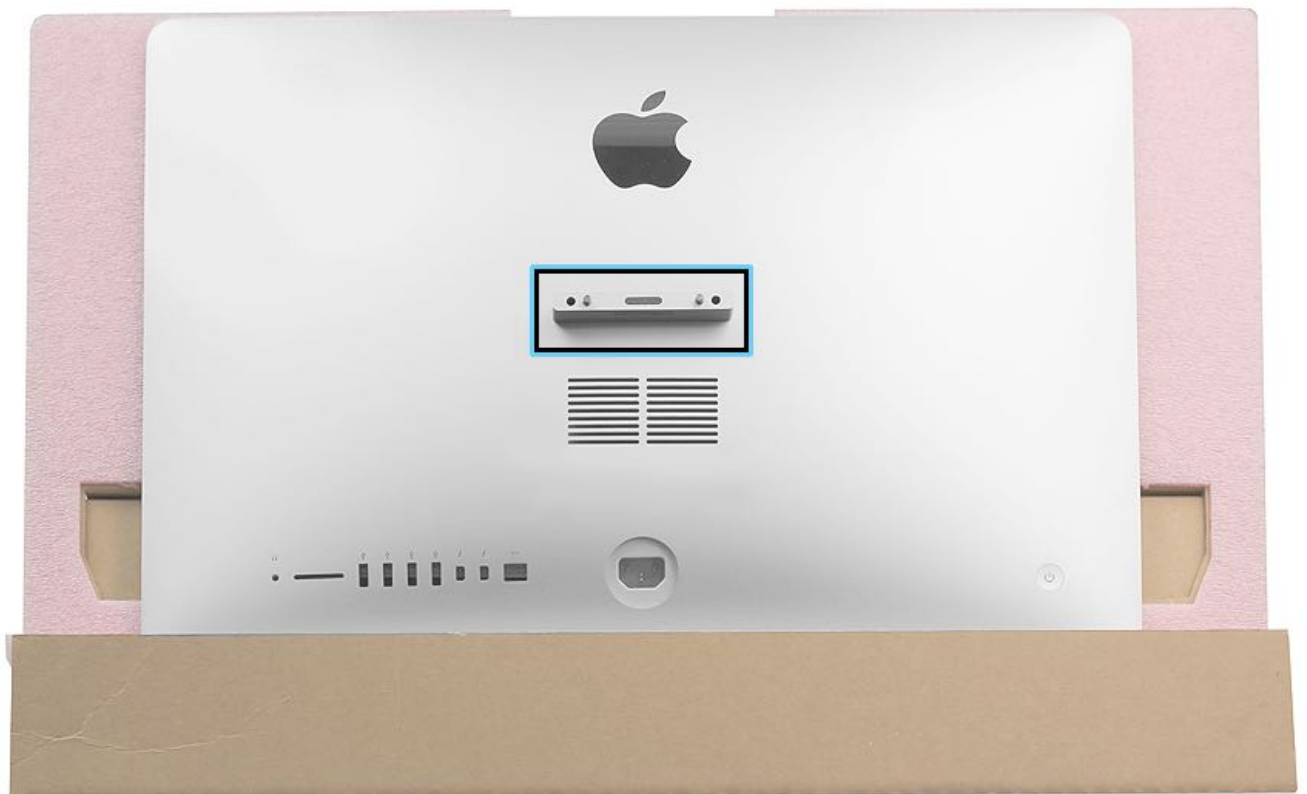


3. Lift the VESA mount adapter off of the rear housing.



### Steps For Reassembly

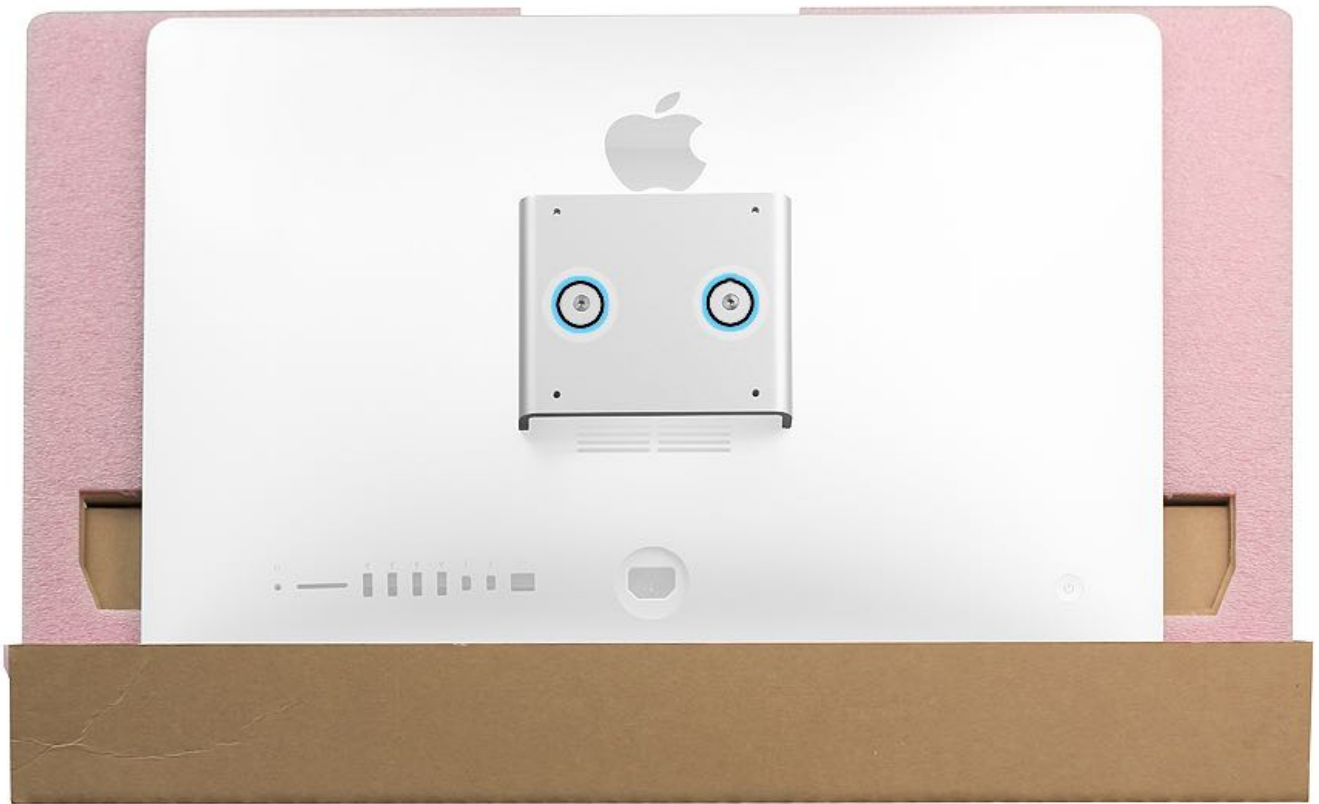
1. Insert the VESA tongue into the opening on the rear housing (if removed).



2. Install the VESA mount adapter with two screws.

- Pentalobe: (923-0417)





3. Reinstall the [power supply](#).
4. Reinstall the [logic board](#).
5. Reinstall the [right speaker](#).
6. Reinstall the [left speaker](#).
7. Reinstall the [chin strap](#).
8. Reinstall the [hard drive cradle](#).
9. Reinstall the [hard drive](#).
10. Reinstall the [hard drive brackets](#).
11. Reinstall the [fan](#).
12. Reinstall the [lower Wi-Fi antenna](#).
13. Reinstall the [middle Wi-Fi antenna](#).
14. Reinstall the [Bluetooth antenna](#).
15. Reinstall the [camera/microphone cable](#).
16. Reinstall the [camera](#).
17. Install new [display panel VHB strips](#).
18. Reinstall the [display panel](#).



# VESA Mechanism Plate

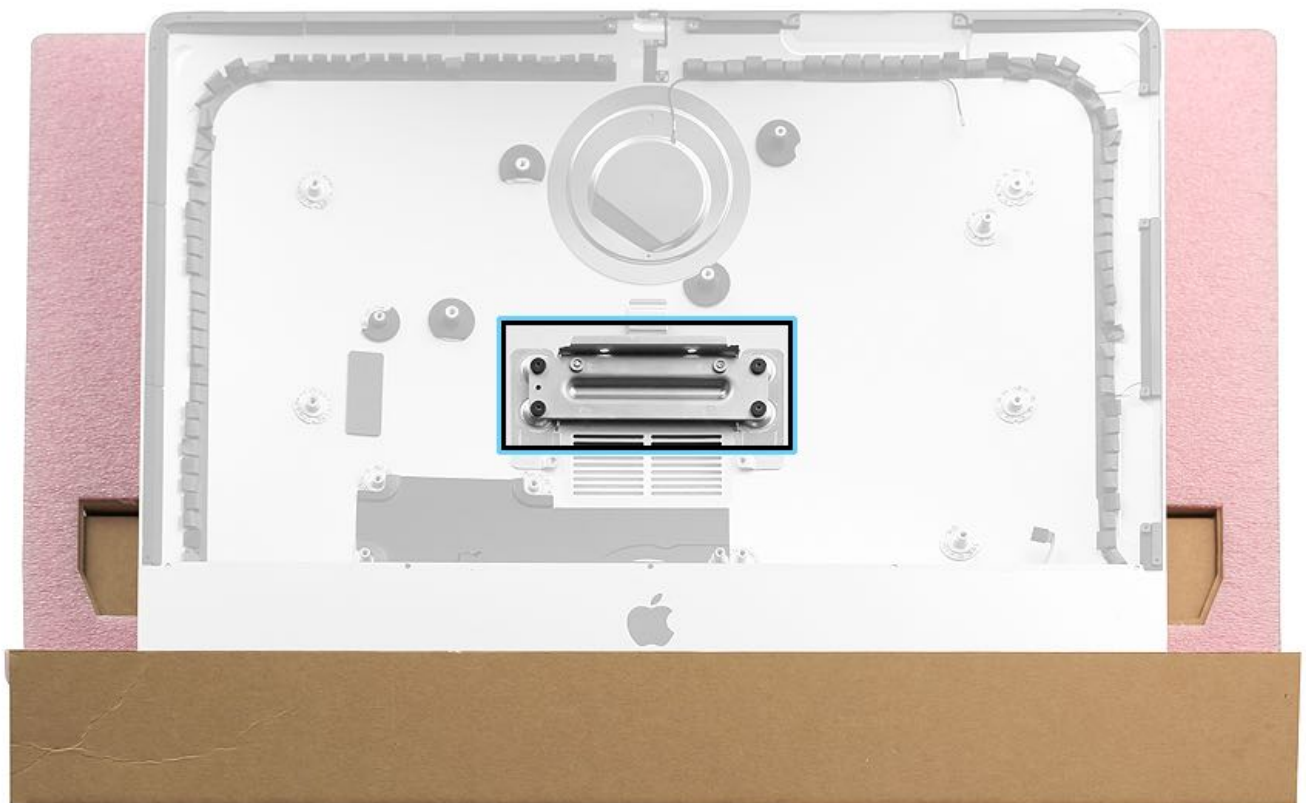
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT205332: About AppleCare service certifications](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Camera](#)
- [Camera/microphone cable](#)
- [Bluetooth antenna](#)
- [Middle Wi-Fi antenna](#)
- [Lower Wi-Fi antenna](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)
- [Right speaker](#)
- [Logic board](#)
- [Power supply](#)
- [VESA mount adapter](#)
- [VESA tongue](#)

**Note:** The chin strap must be removed for this repair.



## Tools

- ESD wrist strap and mat
- Lint-free cloth
- LCD service support stand (923-0416)
- Torx T10 screwdriver
- Kit, LCD Display, VHB for VESA systems (076-1437) (not pictured)



### Steps For Removal

1. Place the computer on the LCD service support stand.
2. Remove four screws.
  - T10: (923-0334)





### Steps For Reassembly

1. Position the VESA mechanism plate in the rear housing.
2. Install four screws.

**Note:** Check that the plate is fully seated after tightening the screws to avoid hinge noise.

- T10: (923-0334)







3. Reinstall the [VESA mount adapter](#) and the [VESA tongue](#).
4. Reinstall the [power supply](#).
5. Reinstall the [logic board](#).
6. Reinstall the [right speaker](#).
7. Reinstall the [left speaker](#).
8. Reinstall the [chin strap](#).
9. Reinstall the [hard drive cradle](#).
10. Reinstall the [hard drive](#).
11. Reinstall the [hard drive brackets](#).
12. Reinstall the [fan](#).
13. Reinstall the [lower Wi-Fi antenna](#).
14. Reinstall the [middle Wi-Fi antenna](#).
15. Reinstall the [Bluetooth antenna](#).
16. Reinstall the [camera/microphone cable](#).
17. Reinstall the [camera](#).
18. Install new [display panel VHB strips](#).
19. Reinstall the [display panel](#).

# VESA Rear Housing

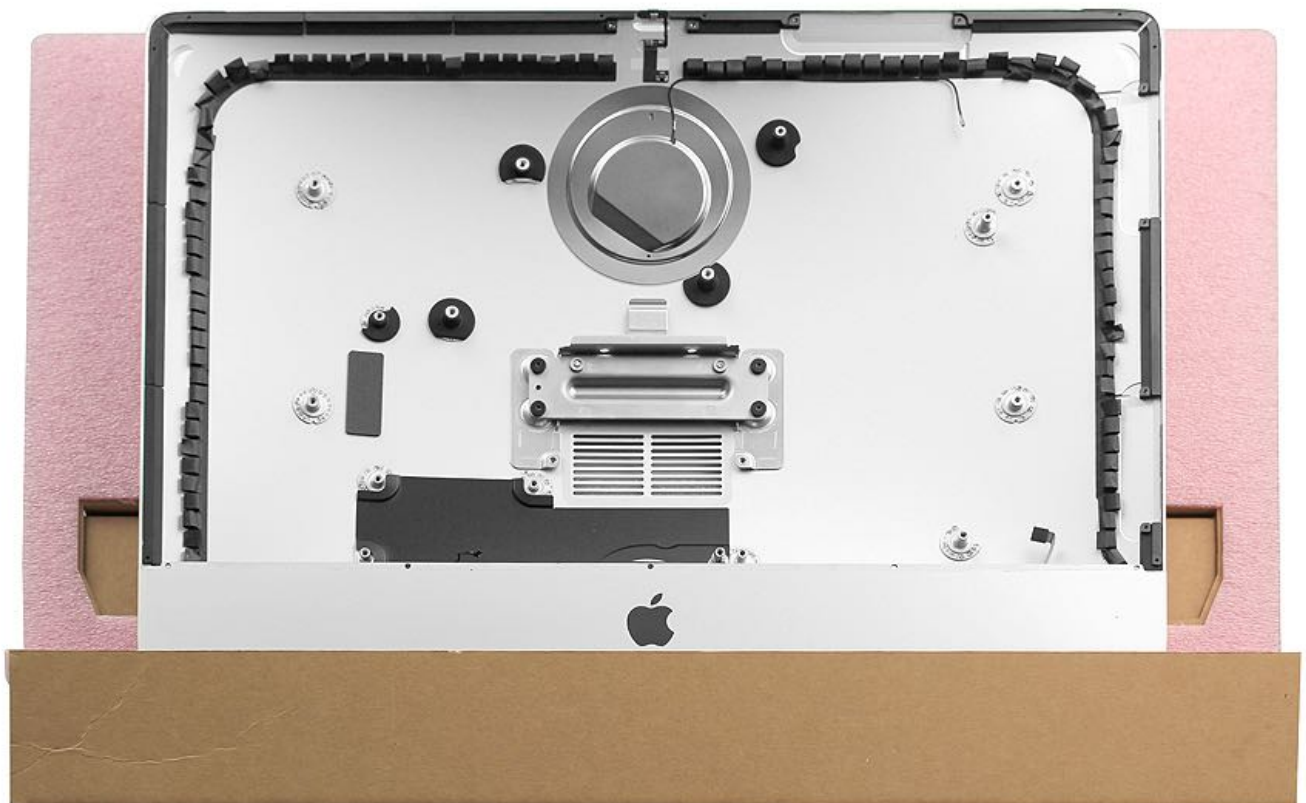
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

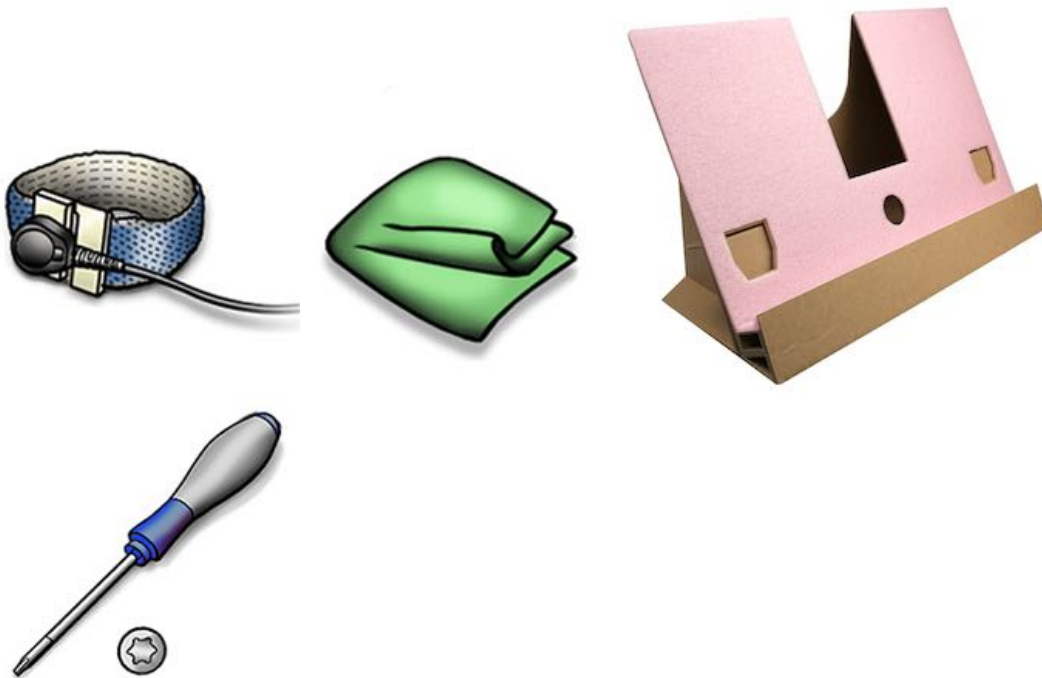
- [Display panel](#)
- [Display panel VHB strips](#)
- [Camera](#)
- [Camera/microphone cable](#)
- [Bluetooth antenna](#)
- [Middle Wi-Fi antenna](#)
- [Lower Wi-Fi antenna](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)
- [Right speaker](#)
- [Logic board](#)
- [Power supply](#)
- [VESA mount adapter](#)
- [VESA tongue](#)

**Note:** The chin strap must be removed for this repair.



## Tools

- ESD wrist strap and mat
- Lint-free cloth
- Kit, LCD Display, VHB for VESA systems (076-1437) (not pictured)
- LCD service support stand (923-0416)



## Steps For Removal

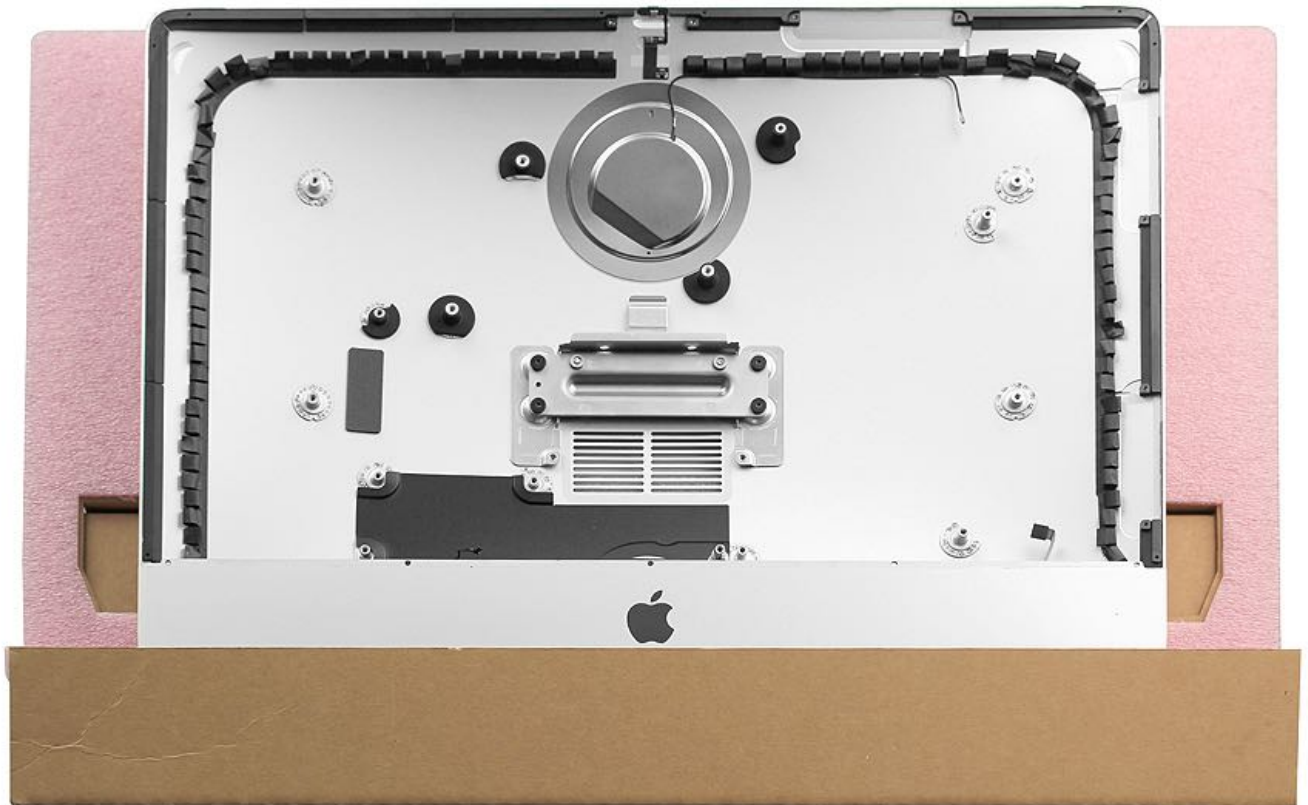
1. Place the computer on the LCD service support stand to remove all modules listed above.
2. With all modules removed, the VESA rear housing is the remaining part.

A new VESA rear housing (923-00557) includes the following parts, which **are not** available separately:

- Wi-Fi antenna in silver circle behind Apple logo
- microphone
- power button and cable
- AC inlet
- gaskets
- wireless antenna insulators

A new VESA rear housing (923-00557) includes the following parts, which are available separately:

- VESA backing plate (923-00561)
- VESA backing plate screws (923-0334)
- VESA pentalobe screws (923-0417)



## Steps For Reassembly

**Caution:** Always handle the rear housing with two hands, in the lower left and right corners. Never carry the rear housing with a single hand or push in or pull out on the chin. Handling the rear housing incorrectly could flex the aluminum and cause alignment issues.

1. Transfer the [Bluetooth antenna](#) as well as the [middle](#) and [lower](#) Wi-Fi antennas to the rear housing.
2. Install the Bluetooth and Wi-Fi antenna insulators in the same locations as on the original housing. Peel the adhesive backing off of the insulators, attach them to the rear housing, and route the antennas under the insulators.
3. Install the [hard drive cradle](#).
4. Transfer the [VESA mount adapter](#) and [VESA tongue](#).
5. Install the [power supply](#).
6. Install the [logic board](#).
7. Install the [right speaker](#).
8. Install the [left speaker](#).
9. Install the [chin strap](#).
10. Install the [hard drive](#).
11. Install the [hard drive brackets](#).
12. Install the [fan](#).
13. Install the [camera/microphone cable](#).
14. Install the [camera](#).
15. Install new [display panel VHB strips](#).
16. Install the [display panel](#).

# VESA Tongue

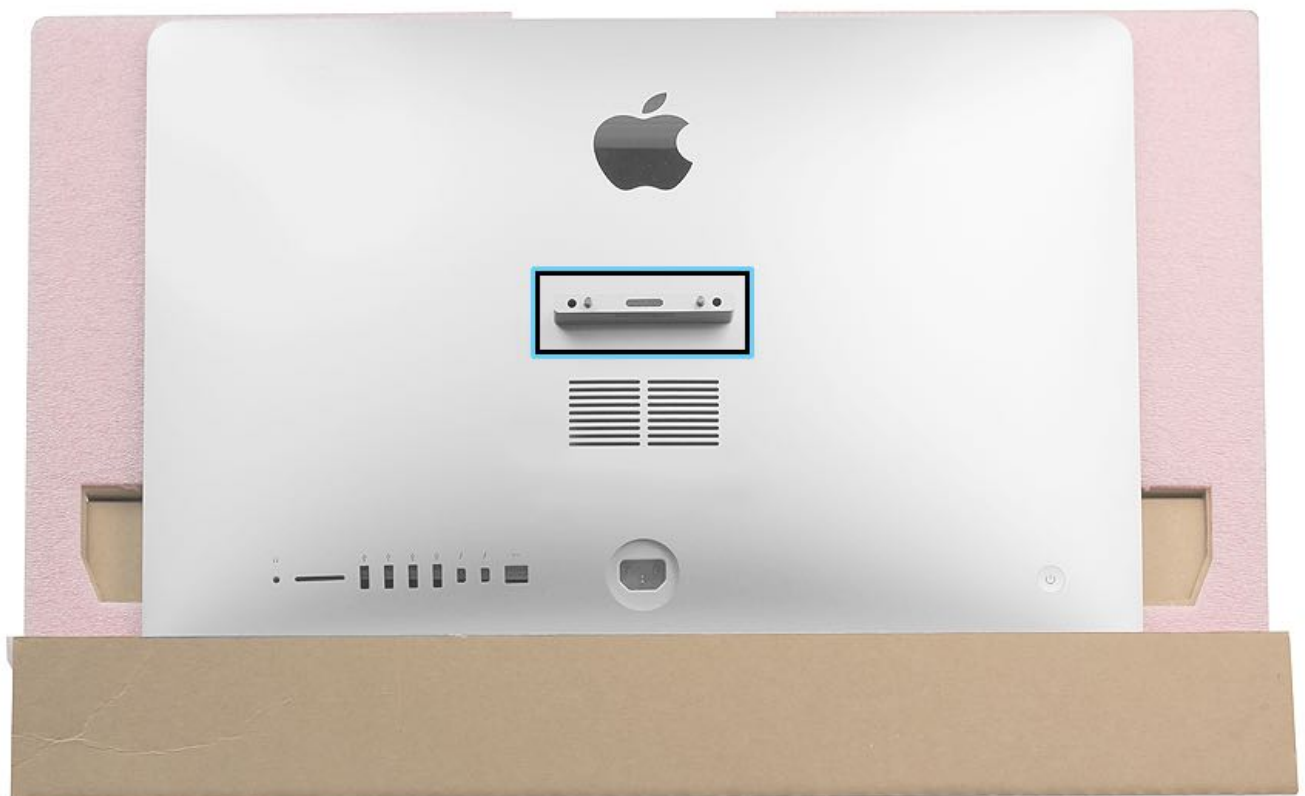
## First Steps

**Important:** This procedure should only be performed by Apple-certified technicians. For more information, refer to article [HT202594: Exams for Service Technicians](#).

Remove:

- [Display panel](#)
- [Display panel VHB strips](#)
- [Camera](#)
- [Camera/microphone cable](#)
- [Bluetooth antenna](#)
- [Middle Wi-Fi antenna](#)
- [Lower Wi-Fi antenna](#)
- [Fan](#)
- [Hard drive brackets](#)
- [Hard drive](#)
- [Hard drive cradle](#)
- [Chin strap](#)
- [Left speaker](#)
- [Right speaker](#)
- [Logic board](#)
- [Power supply](#)
- [VESA mechanism plate](#)

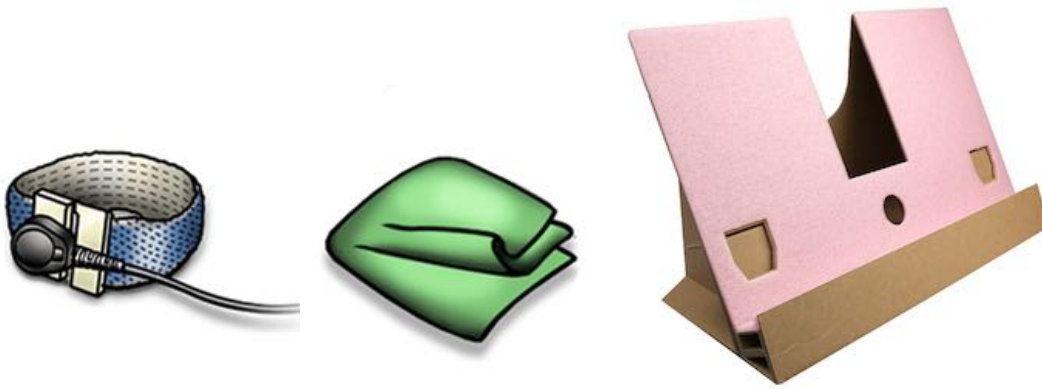
**Note:** The chin strap must be removed for this repair.



## Tools

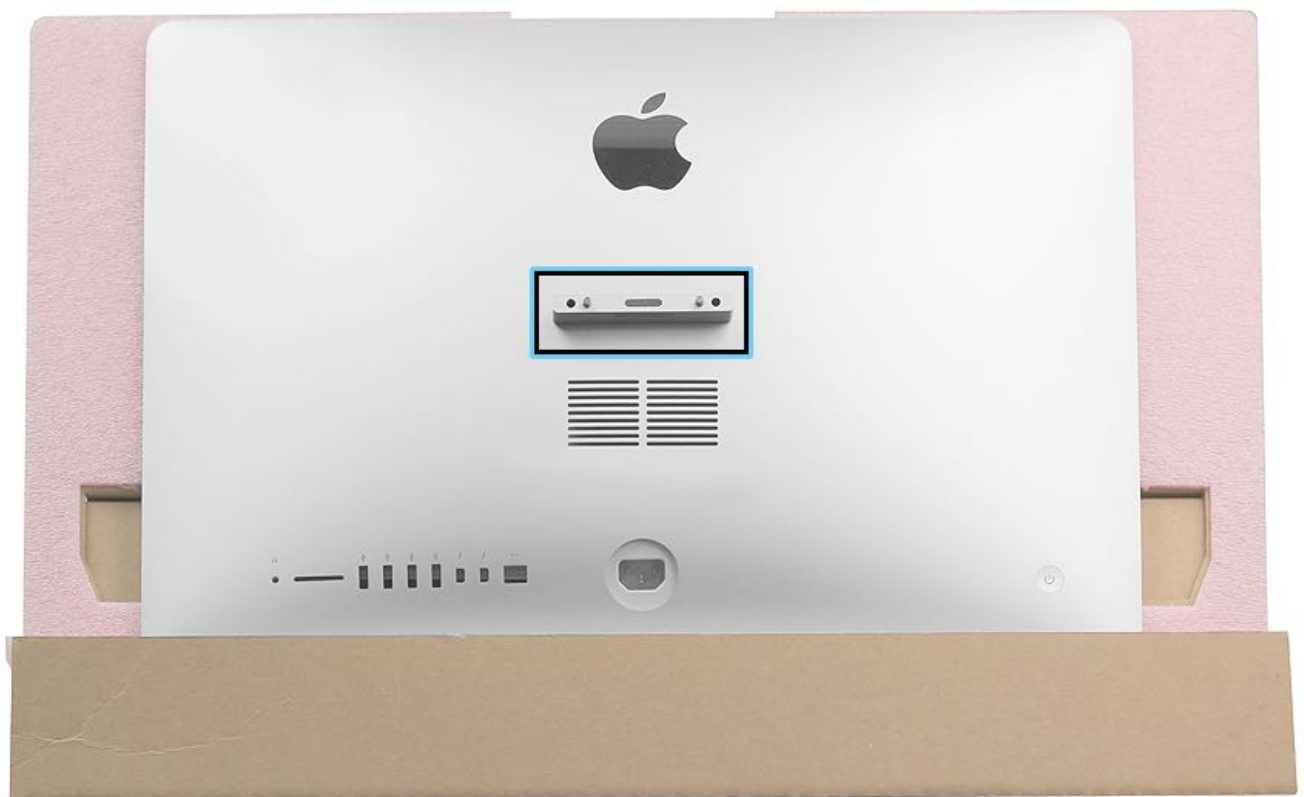
- ESD wrist strap and mat
- Lint-free cloth
- Kit, LCD Display, VHB for VESA systems (076-1437) (not pictured)
- LCD service support stand (923-0416)





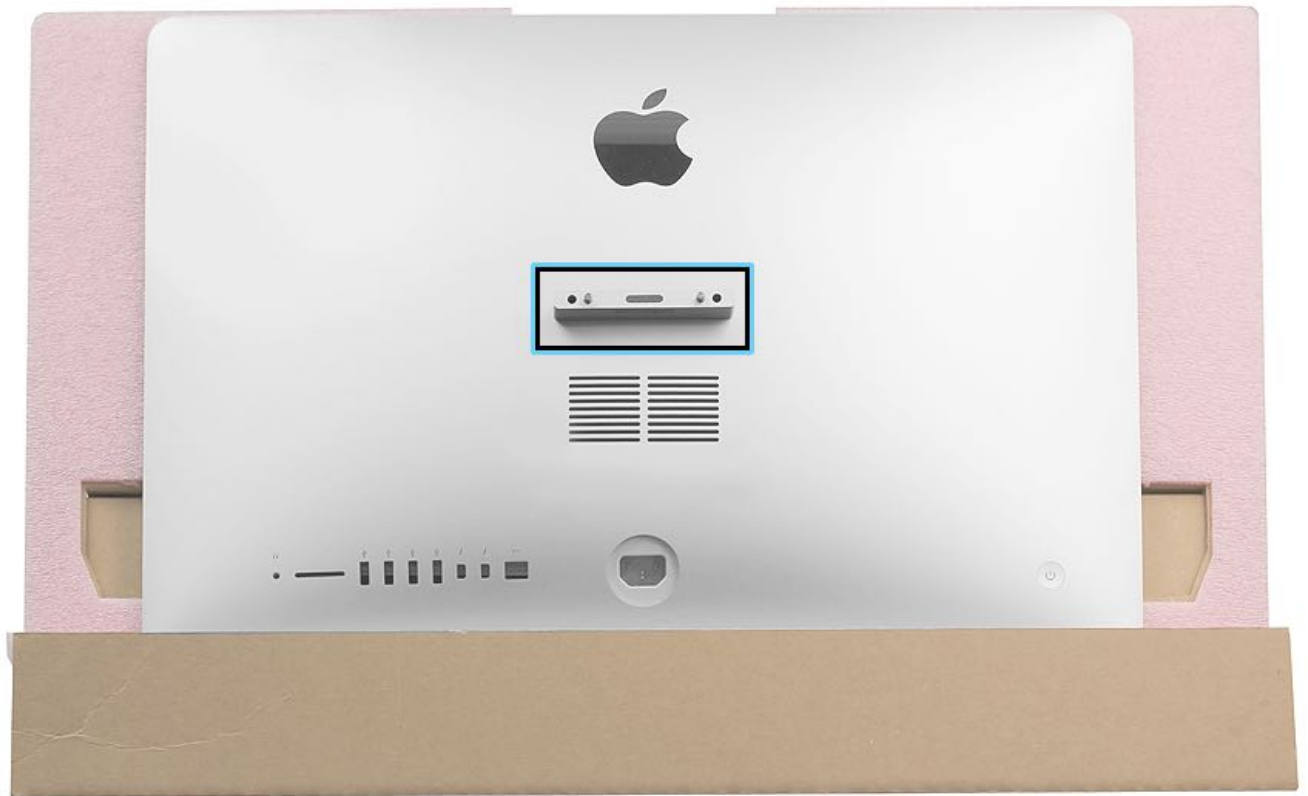
### Steps For Removal

1. Place the rear housing on the LCD support stand with the VESA tongue facing you.
2. Pull the VESA tongue off of the rear housing. **Note:** The computer serial number is on the underside of the VESA tongue.



### Steps For Reassembly

1. Insert the VESA tongue into the opening on the rear housing.

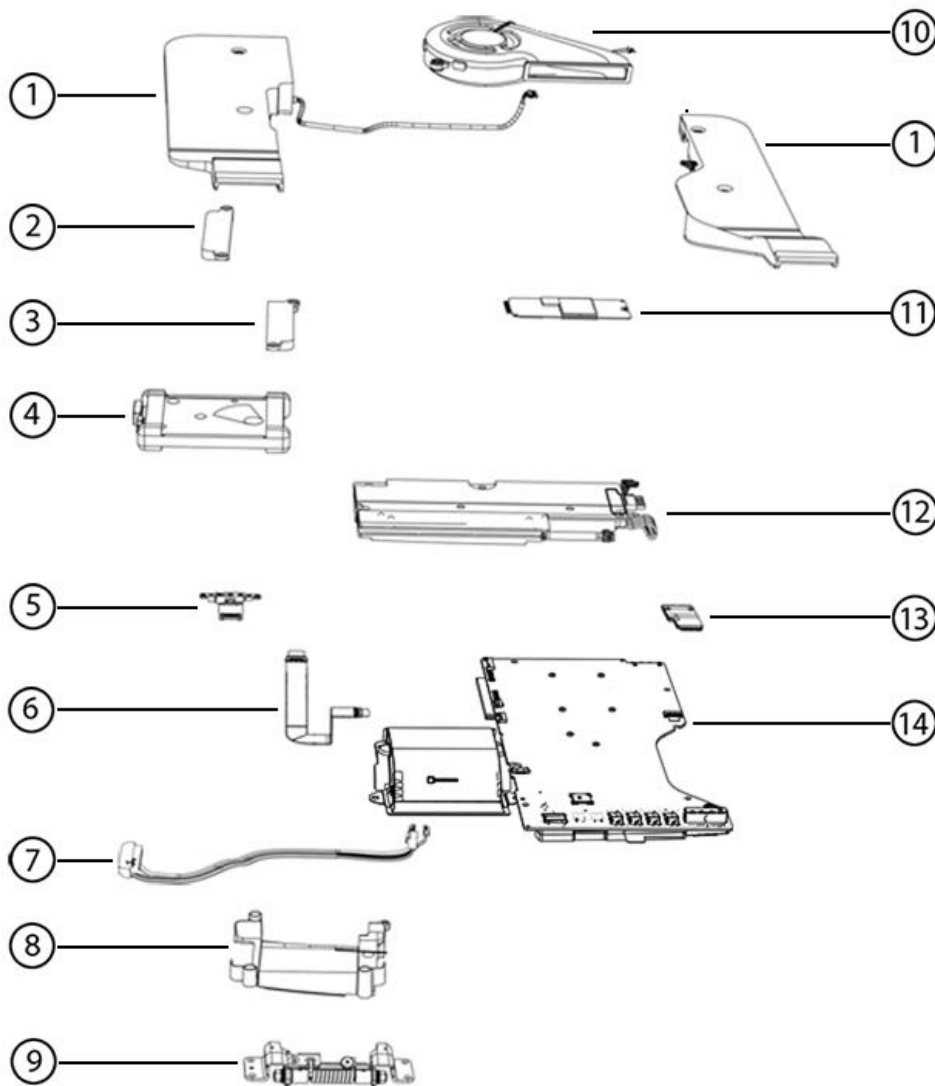


2. Reinstall the [VESA mechanism plate](#).
3. Reinstall the [power supply](#).
4. Reinstall the [logic board](#).
5. Reinstall the [right speaker](#).
6. Reinstall the [left speaker](#).
7. Reinstall the [chin strap](#).
8. Reinstall the [hard drive cradle](#).
9. Reinstall the [hard drive](#).
10. Reinstall the [hard drive brackets](#).
11. Reinstall the [fan](#).
12. Reinstall the [lower Wi-Fi antenna](#).
13. Reinstall the [middle Wi-Fi antenna](#).
14. Reinstall the [Bluetooth antenna](#).
15. Reinstall the [camera/microphone cable](#).
16. Reinstall the [camera](#).
17. Install new [display panel VHB strips](#).
18. Reinstall the [display panel](#).

# Exploded Views

Exploded Views for iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

## Exploded View #1



### 1. Speakers, Left and Right, Pair

- 923-00030

### 2. and 3. Left and Right Hard Drive Lid

- 076-00090 included in kit

### 4. Hard Drive with Bumpers

- 661-02888, 1TB (1.6GHz model only)
- 661-02889, 1TB (2.8GHz, 3.1GHz, and 3.3GHz models)
- 661-02890, 2TB

### 5. Camera

- 923-00572

### 6. Camera/Mic Cable

- 923-00564

### 7. Hard Drive Cable, Combo

- 923-00565

## 8. Hard Drive Cradle

- 076-00090 included in kit

## 9. Mechanism

- 923-00561

## 10. Fan

- 923-00563

## 11. Flash Storage

### 1.6GHz model

- 661-03564, 256GB
- 661-03527, 32GB (Fusion)

### 2.8GHz, 3.1GHz, and 3.3GHz models

- 661-03558, 128GB
- 661-03559, 256GB
- 661-03560, 512GB
- 661-03525, 32GB (Fusion)

## 12. Power Supply

- 661-7512

## 13. Wireless Card

- 661-02893

**Note:** Use the country prefix in front of the part number to indicate the correct country, i.e., ID661-02893, India; J-Japan; KH-Korea; PAC-Pacific; Z-English International; ZM-Multilingual

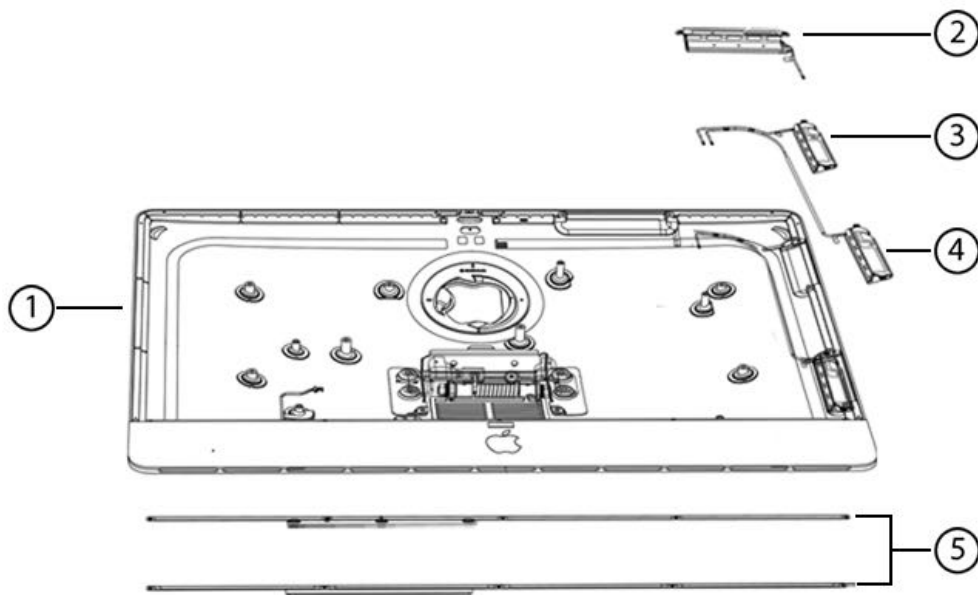
## 14. Logic Board

- 661-02884, 1.6GHz, i5, 8 GB, no SSD connector
- 661-02885, 1.6GHz, i5, 8 GB, SSD connector
- 661-02886, 1.6GHz, i5, 16 GB, no SSD connector
- 661-02887, 1.6GHz, i5, 16 GB, SSD connector
- 661-02981, 2.8GHz, i5, 8 GB, no SSD connector
- 661-02982, 2.8GHz, i5, 8 GB, SSD connector
- 661-02983, 2.8GHz, i5, 16 GB, no SSD connector
- 661-02984, 2.8GHz, i5, 16 GB, SSD connector
- 661-02985, 3.1GHz, i5, 8 GB, SSD connector
- 661-03282, 3.1GHz, i5, 8 GB, no SSD connector
- 661-02986, 3.1GHz, i5, 16 GB, SSD connector
- 661-03279, 3.1GHz, i5, 16 GB, no SSD connector
- 661-02987, 3.3GHz, i7, 8 GB, SSD connector
- 661-03280, 3.3GHz, i7, 8 GB, no SSD connector
- 661-02988, 3.3GHz, i7, 16 GB, SSD connector
- 661-03281, 3.3GHz, i7, 16 GB, no SSD connector

### Not shown:

- **Hard Drive Cradle Kit**, 076-00090
- **Kit, Thermal Pad, Wireless Card**, 076-1445

## Exploded View #2



**1. Rear Housing, includes antennas (#2, #3, and #4)**

- 923-00556
- 923-00557, VESA

**2. Bluetooth Antenna**

- 923-00567

**3. Middle Wi-Fi Antenna**

- 923-00569

**4. Lower Wi-Fi Antenna**

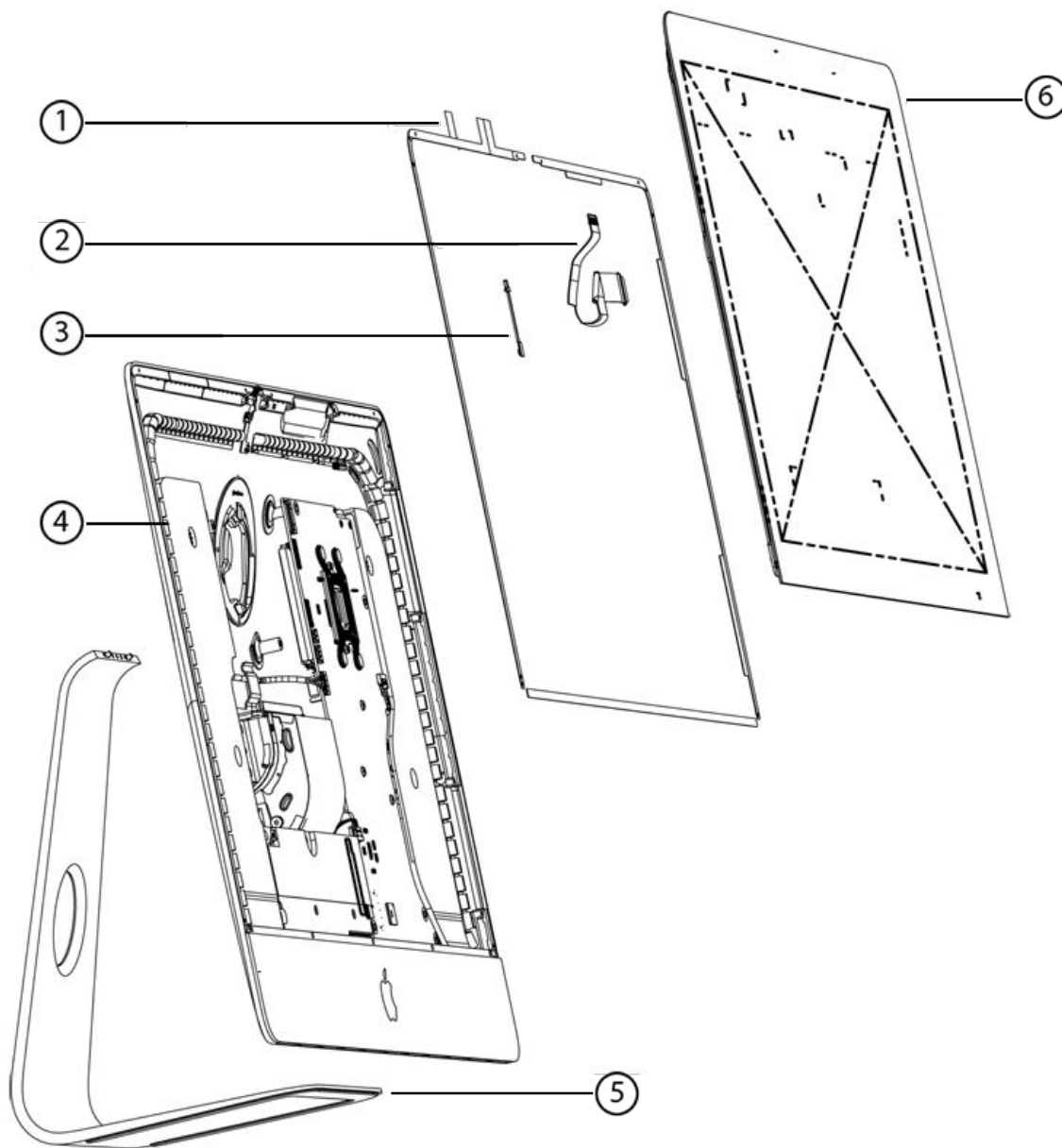
- 923-00570

**5. Chin Strap**

- 923-00562

**Exploded View #3**





#### 1. Very High Bond (VHB) Adhesive Strips

- See article [TP818: Required Tools](#).

#### 2. Cable, Embedded DisplayPort (eDP)

- 923-00566 (1.6GHz model only)
- 923-00607 (2.8GHz, 3.1GHz, and 3.3GHz models without Retina display)
- 923-00608 (2.8GHz, 3.1GHz, and 3.3GHz models with Retina display)

#### 3. LCD Temp Sensor

- 923-0280

#### 4. Rear Housing

- 923-00556
- 923-00557, VESA

#### 5. Stand

- 923-00558 (1.6GHz model only)
- 923-00615 (2.8GHz, 3.1GHz, and 3.3GHz models)

#### 6. Display Assembly

- 661-02891 (1.6GHz model only)
- 661-02989 (2.8GHz, 3.1GHz, and 3.3GHz models without Retina display)

- 661-02990 (2.8GHz, 3.1GHz, and 3.3GHz models with Retina display)

**Not shown:**

**Mechanism Plate**, 923-00559

**VESA Mechanism Plate**, 923-00561

**VESA Tongue**

- 923-00560 (1.6GHz model only)
- 923-00614 (2.8GHz, 3.1GHz, and 3.3GHz models)

**VESA Mount Adapter**, 923-0421

**Note:** Effective immediately, some coin cell batteries used on Mac systems are now available only from electronics parts distributors (for example, MCM). The coin battery is no longer available to order via GSX. When the Mac repair process indicates the coin battery needs to be replaced, please order it from an electronics parts distributor. **Note:** BR2032 and CR2032 batteries have the same form factor and nominal voltage. However, BR2032 batteries have a lower self-discharge rate and broader operating temperature range than CR2032 batteries for longer shelf and service life.

## External Views

External Views of iMac (21.5-inch, Late 2012, Early 2013, Late 2013, Mid 2014, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)

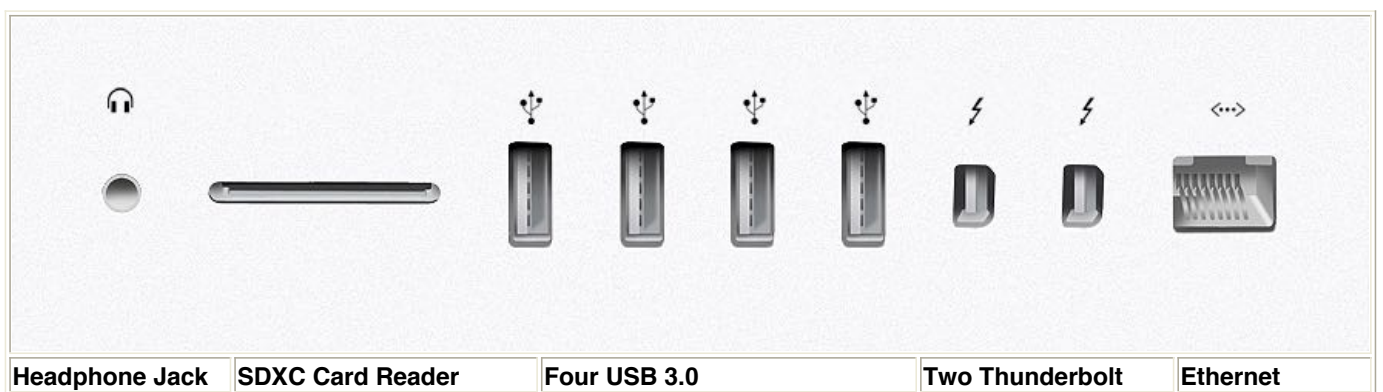
### Front View



### Rear View

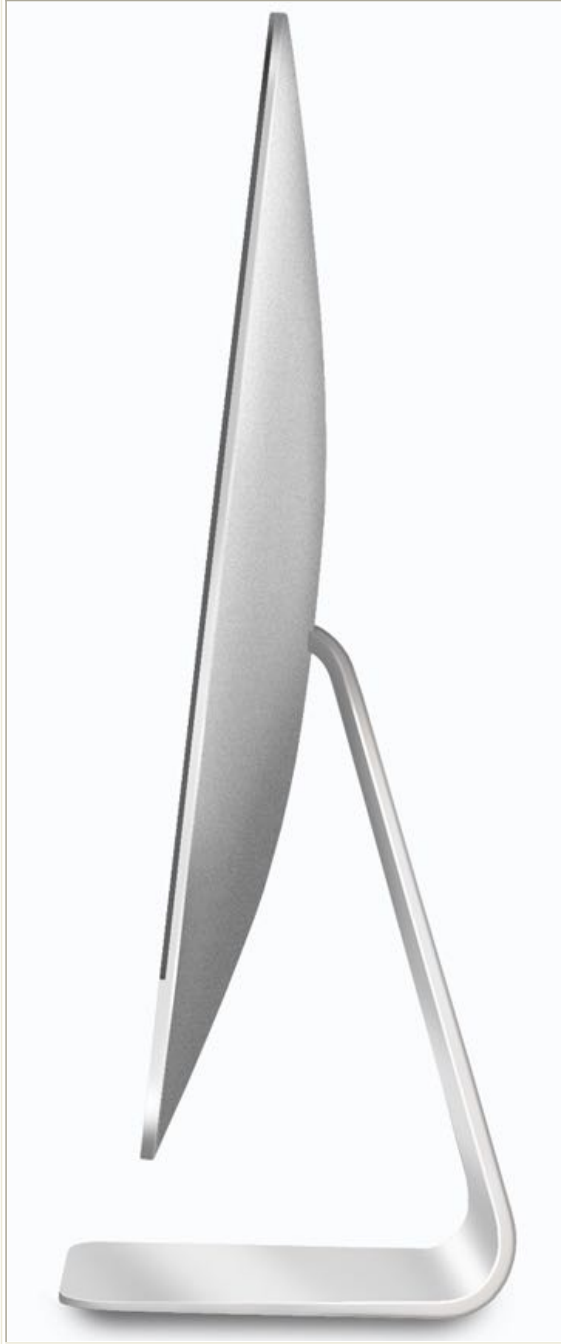


## Rear Ports

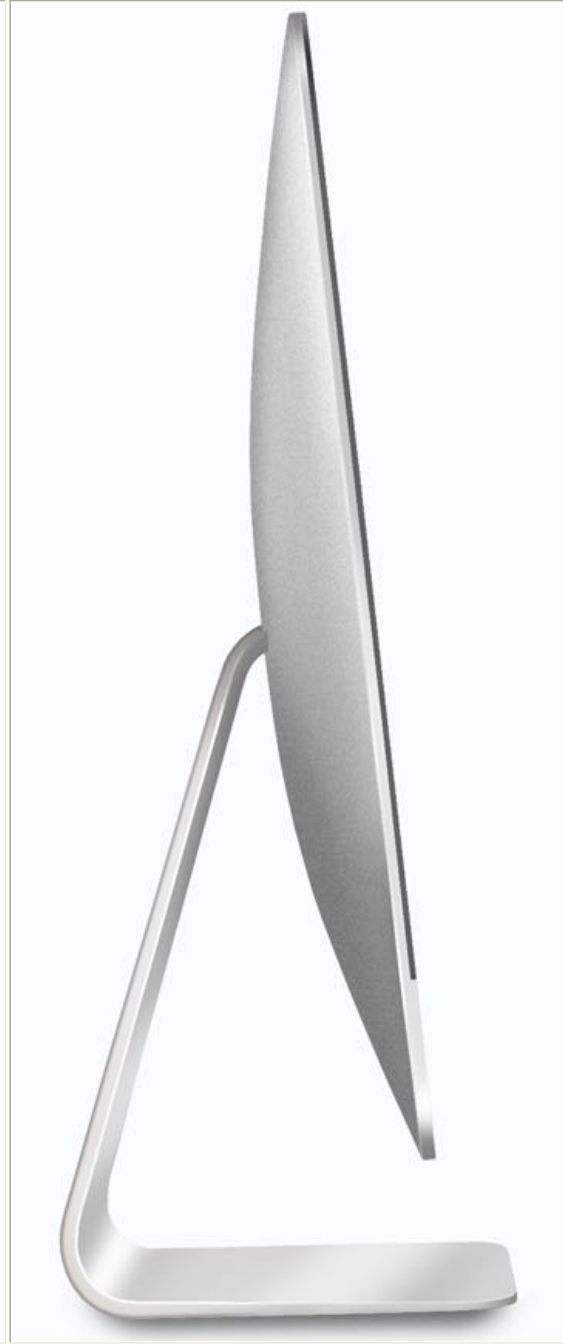


**Note:** The Late 2015 models have Thunderbolt 2.

**Side View Right**



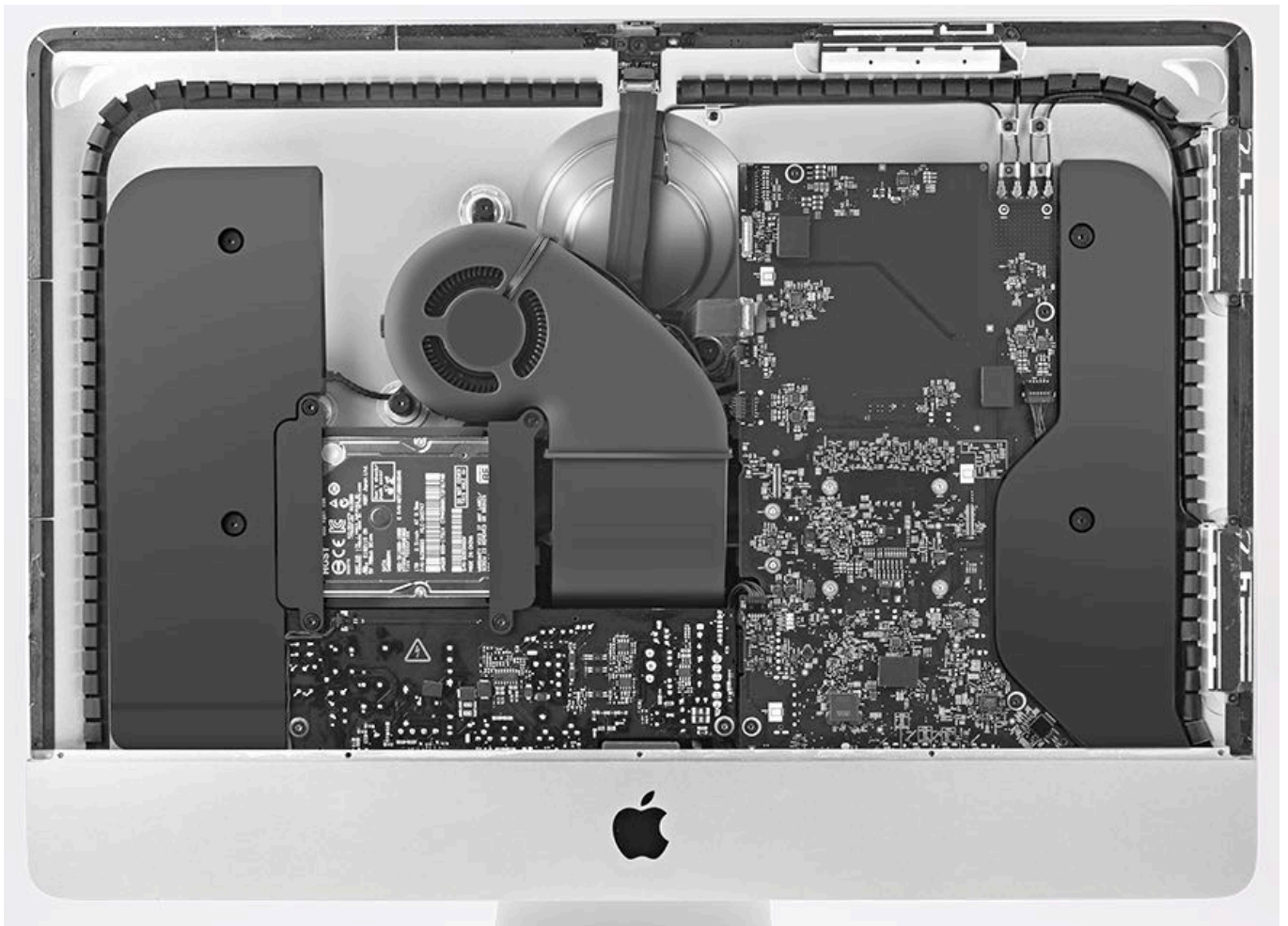
**Side View Left**

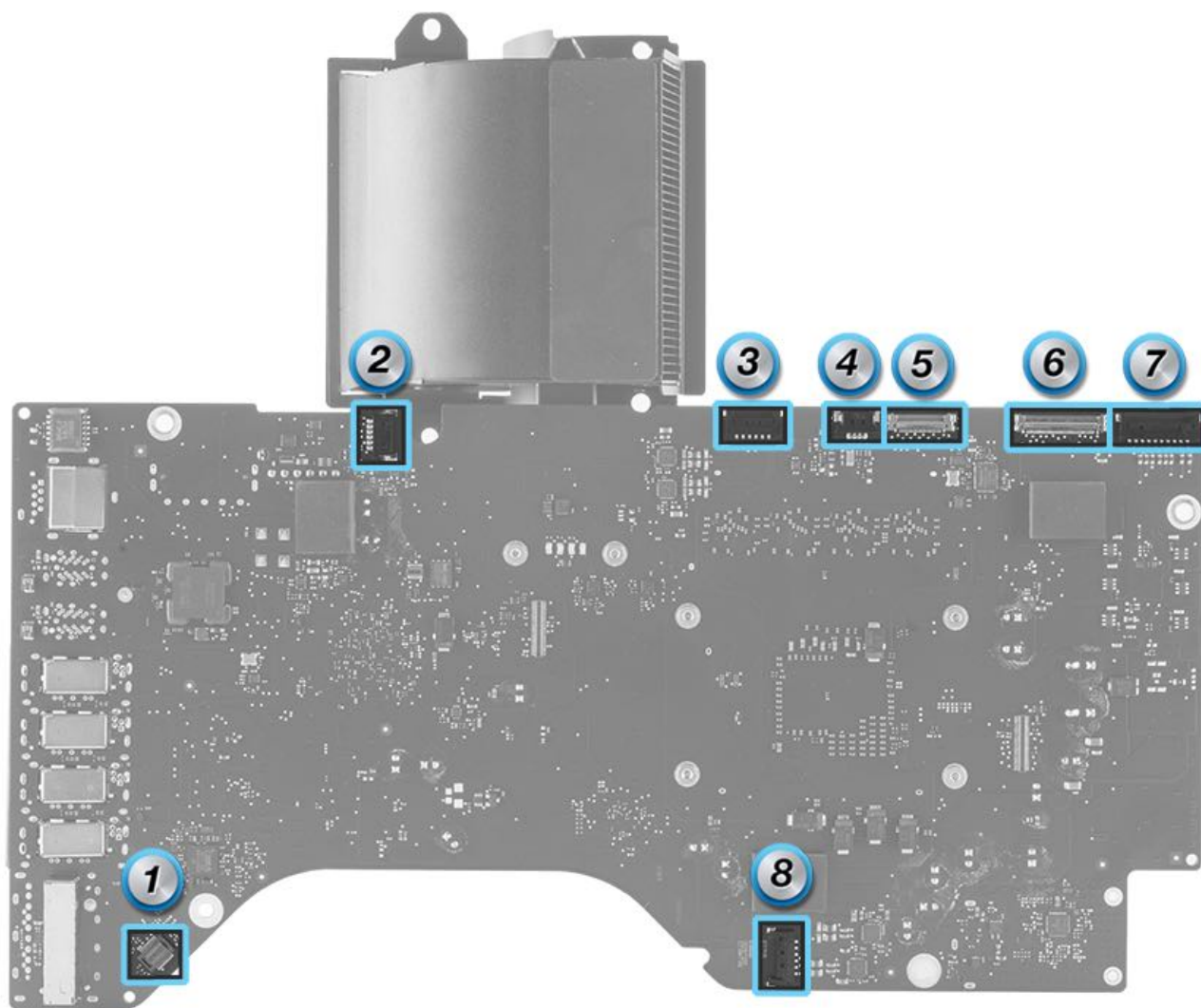




## Internal Views

Internal Views of iMac (21.5-inch, Late 2015) and iMac (Retina 4K, 21.5-inch, Late 2015)





1. Audio jack connector
2. Power supply data cable
3. Left speaker
4. Fan
5. Display panel cable
6. Camera/microphone cable
7. Embedded DisplayPort (eDP) cable
8. Right speaker

**Note:** Refer to article [TP1368: Functional Overview](#) for details on the logic board.

# Screw Chart

## Screw Chart for iMac (21.5-inch, Late 2015 and 2017) and iMac (Retina 4K, 21.5-inch, Late 2015 and 2017)

**Note:** Screws are not to scale.

<b>923-0333</b> T10  Fan (3)	<b>923-0339</b> T4  Camera (2)	<b>923-0335</b> Phillips #00  Chin strap - center (1)
<b>923-0338</b> Phillips #00  Chin strap - sides (4)	<b>923-0324</b> T10  Hard drive bracket (2)	<b>923-0323</b> T10  Hard drive bracket (1)
<b>923-0325</b> T10  Hard drive bracket (1)	<b>923-0333</b> T10  Right and left speaker (4)	<b>923-0327</b> T10  Heat sink (upper finstack) (2)
<b>923-0336</b> T8  Heat sink (lower finstack) (2); flash storage (1)	<b>923-00609</b> T5  Wireless antenna bracket to wireless card (2)	<b>923-00571 (Late 2015)</b> T4  Wireless card (2)

<b>923-00831</b> T4  Wireless antenna to rear housing	<b>923-0331</b> T8  Logic board (4); hard drive cradle (1); power supply (2)	<b>923-00529</b> T8  Stand (7)
<b>923-0334</b> T10  Mechanism (6)	<b>923-0417</b> Pentalobe  VESA (2)	<b>923-01677 (2017)</b> T4  Wireless card (2)

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